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OF
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CLINIC OF DR. RUDOLPH MATAS

CHARITY HOSPITAL, NEW ORLEANS

A RARE ANOMALY FOUND IN A CONGENITAL RIGHT INGUINAL HERNIA; A TUBULAR DIVERTICULUM OR PROLONGATION OF THE RIGHT SEMINAL VESICLE EXTENDING INTO THE SCROTUM AS A COMPONENT OF THE SPERMATIC CORD

THE subject of this observation, Joseph M., was admitted to our service, Ward 69 (Hospital No. C-2522), March 1, 1922. He is a young white farmer who has resided all his life in Franklin, La. He was admitted for the relief of a right inguinal hernia which had made its appearance eight months ago. He attributed the rupture to the lifting of heavy cross-ties. The hernia has grown steadily larger in spite of a truss which he has worn continuously during the last three months.

The hereditary antecedents and personal history of this patient offer no facts of special interest, and the physical examination merely confirms the general impression that the patient is a robust, healthy, and well-proportioned young man, unusually free from venereal taint, whose only disability is the hernia which has brought him to the hospital for operation.

As the chief interest attached to this observation lies in the peculiar and rare anomaly that was discovered in the spermatic cord when the hernial sac was opened, I shall confine myself to a statement of the operative findings as these were brought to light and dictated in the course of the operation.

Operation (March 6, 1922).—The operation was planned for the radical cure of a right inguinal hernia, under local and

regional analgesia, with apothesin-adrenalin solution applied by infiltration with a Dunn syringe. On opening the sac it was found to be a typical congenital hernia in which the processus vaginalis

Fig. 453.—Case of Joseph M. Anomalous diverticulum or prolongation of seminal vesicle forming part of the spermatic cord. The "diverticulum" is exhibited as it presented itself on opening the hernial sac, as a part of the spermatic cord in a congenital hernia

continued directly with the tunica vaginalis, leaving the testicle exposed in the sac. The most striking feature of the operation at this stage was the appearance of a long tubular mass which bulged prominently into the hernial sac and extended the full

length of the spermatic cord. It began about 1 inch (2½ cm.) above the epididymis, extending upward as a component of the spermatic cord into the inguinal canal and beyond the internal ring, thence backward and downward, following the course of the vas deferens to the base of the bladder, where it was apparently lost in the right seminal vesicle and prostate. This membranous tube formed one of the elements of the spermatic cord and was intimately adherent to the vas deferens and to the spermatic vessels. It was entirely extraperitoneal, but most intimately adherent to the posterior layer of the sac, which was extremely thin, making it difficult to detach it from the underlying components of the cord.

This anomalous mass (Fig. 453), as first seen projecting through the thin translucent posterior layer of the sac, had the appearance of a long, narrow sausage. At first it was taken to be a chronically inflamed spermatic plexus, enlarged and indurated by thrombophlebitis. On further investigation and dissection the enlargement of the cord was found to be due to the presence of this anomalous structure or organ which could not be identified with any of the normal components of the cord. It was blended and fused most intimately with the vas deferens and the vessels of the cord were displaced and bound together behind it. An incision was made longitudinally into it and parallel with its long axis. This at once opened a hollow tube which, beginning about 1 inch (2½ cm.) from the testicle along the cord to the level of the internal ring, where it disappeared in the retroperitoneal connective tissues (Fig. 454). A No. 10 (English) soft-rubber catheter was introduced into the lumen of the tube and it traveled easily and without resistance beyond the internal ring for a distance of 7 or 8 inches (18 or 20½ cm.), when it met with a resistance, and would go no farther. No fluid or secretion of any sort escaped from the catheter as this was withdrawn, showing that the abnormal channel was not a diverticulum of the bladder, as had been suggested. Only a long string of clear, glairy, translucent mucus followed the extraction of the catheter.

An attempt was now made to isolate this tubular body and

detach it from its surroundings, but this could not be accomplished without dividing or cutting into the vas deferens, which was almost fused with the diverticulum throughout its scrotal length. In fact, it was while attempting to dissect and detach the lower end of this diverticulum at its blind terminus near the epididymis that the vas was accidently cut through, but its

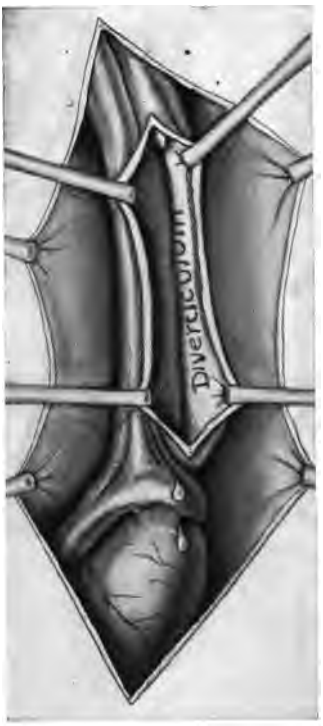


Fig. 454.—The diverticulum opened exposing the tubular channel which allowed a No. 10 English soft-rubber catheter to penetrate the lumen as far as the level of the right seminal vesicle.

dissection and separation from the anomalous tube was effected higher up. The vas was now isolated from the diverticulum up to and a little beyond the level of the internal ring, when the adhesion of these two structures was again so close and intimate that it would have been impossible to separate the two without injuring the vas. After the detachment and mobilization of the

whole scrotal portion of the anomalous structure (which we shall continue to describe as the *diverticulum*) no further attempts were made to separate it from the vas, while further efforts were made to identify it, or at least determine its relations. The extra-abdominal part of the diverticulum from its blind terminus in the scrotum up to the level of the internal ring was fully 3½ inches (9 cm.) in length, about half the thickness of the little finger, and formed a distinct, well-lined, glistening mucous canal of a bluish-white color. The mucous canal easily admitted a No. 12 English catheter, and was wrapped up in a thick, easily differentiated muscular coat covered by an areolar layer, which together gave the wall of the tube an even thickness of at least ¼ inch (6 mm.). With the finger introduced into the peritoneal cavity through the hernial canal the outline of this tubular cord could be easily traced over the peritoneum and followed to the base of the bladder. The same impression was conveyed when the diverticulum with the attached vas deferens was followed as far as the finger could reach into the pelvis through the perivesical extraperitoneal space.

Without attempting further investigation traction was made on the diverticulum so as to exteriorize it to the fullest extent beyond the internal ring. It was crushed with forceps and then ligated at this level with chromic catgut. After this section the ligated end immediately retracted and disappeared beyond the level of the ring and within the pelvis, where further retraction was, no doubt, prevented by the vas deferens to which it was held. The vas deferens was then inspected in its scrotal portion at the point where it had been divided near the testis. The cut ends were then brought together by a single fine intracanalicular silk suture.

The hernial sac was now cut off from the testis, leaving a small collar of sac to represent the tunica vaginalis, which was allowed to remain open, leaving the testis uncovered by serosa in the scrotum.

Attention was now given to the closing of the hernial ring. This was large enough to admit the tips of three fingers, with its greatest breadth parallel to Poupart's ligament.

The cecum was found adherent and fixed, without meso, to the sac just external to the level of the internal ring, clearly pointing to the beginning of a *sliding hernia* of the cecum.

Before closing the ring the appendix was sought and found, but with very considerable difficulty, in the retrocecal fossa, pointing upward and inward for a distance of about 3½ inches (9 cm.), closely adherent to the posterior wall of the cecum, without meso, with its tip, for a distance of 1 inch, alone movable.

To remove the appendix would have required an extension of the hernial incision through the ring, and thus transforming the herniotomy into a laparotomy and probably invite a relapse of the hernia, owing to the weakness of the abdominal wall created by the additional incision. Therefore, as the appendix was not diseased, it was allowed to remain undisturbed in its bed. Careful note was taken of its position so that its removal might be facilitated by separate incision at some future time, if the patient chose to have this done.

Attention was now given to the closure of the large hernial ring. This was done by an intraperitoneal suture—an endoperitoneorrhaphy—with fine silk, which completely obliterated the depression in the inguinal fossa while closing the ring at the highest possible level, thereby lifting the sliding cecum beyond the hernial plane.

The cuff of peritoneum projecting above the line of suture was now folded over itself with a continued catgut suture and transformed into a pad or buffer, which protected the first line of peritoneal sutures.

The rest of the operation was carried out on the line of an ordinary hernioplasty. The cord, now very largely reduced by excision of the diverticulum,[1] was allowed to remain undisturbed, and the myoplasty completed by anchoring the conjoined tendon to Poupart's ligament, and overlapping the external oblique aponeurosis in the usual way.

Postoperative Notes.—On rectal examination the day follow-

[1] The specimen was sent to the Pathological Department of the hospital, where Dr. R. D'Aunoy is studying the section for a detailed histologic report at a later date.

ing the operation a thick elongated cord could be easily felt on the right side of the rectovesical space corresponding to the region of the right seminal vesicle. This extended upward and toward the right groin. This swollen cord was continuous with the seminal vesicle and was tender and painful to the touch. On the opposite side the left seminal vesicle could be felt in normal outline and free from any appreciable abnormality.

The recovery of this patient was uneventful; the sutures were removed on the eighth day and the patient was discharged, completely healed, walking out of the hospital on March 21, 1922.

Discussion.—This observation is instructive and interesting from the practical operating surgeon's point of view as well as from that of the anatomist and embryologist.

I judge of the interest attached to this observation by my own doubts and perplexities in differentiating this unusual structure when it was revealed to me on opening the hernial sac. The diagnostic possibilities, such as chronic thrombophlebitis, varicosities, diverticulum of the bladder, hydrocele of the cord, lipoma of the cord, cysts of the wolffian duct, etc., were all rapidly passed in review, but all were promptly dismissed as incompatible with the peculiarities of this anomalous body as these developed in the course of the examination. It was only after the duct-like mass was isolated, opened, and its lumen explored with a catheter and traced to its origin in the retroprostatic trigone that the conclusion was arrived at that this abnormal organ was the result of a congenital aberration of development in the seminal vesicles. There is no great difficulty in conceiving how this anomaly could occur in the course of fetal development. The vesicles and vas deferens are derivatives of the same embryonal source—the wolffian duct—the vesicles representing only a single tube which is a prolongation of the vas itself. This tube in postnatal life is coiled upon itself, giving off several irregular blind diverticula, the separate coils, as well as the diverticula, being held together by connective tissue. When uncoiled this tube is about the diameter of a large quill (6–8 mm.) and varies in length from 6 to 10 inches (12–20 cm.). It terminates posteriorly in a culdesac; its anterior extremity

becomes constricted into a narrow straight duct, the excretory duct, which joins the corresponding seminal duct and forms the ejaculatory duct. It is easy to reconstruct the present anomaly from this description. The diagrams (Figs. 455, 456) show how the vesicle may have remained a continuous tube, uncoiled, after birth, or that one of the blind diverticula may have grown to excessive length in fetal life.

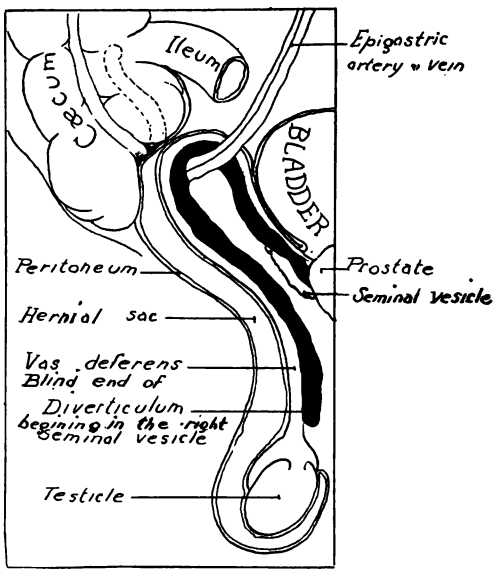
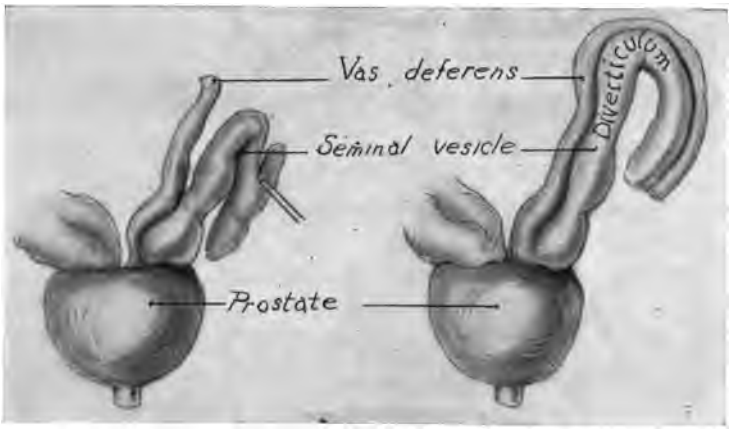


Fig. 455.—Diagram showing the beginning of the anomalous diverticulum in the right seminal vesicle following the vas deferens to which it was attached and ending as a closed tube 1 cm. above the epididymis. Note also the congenital hernial sac continuous with the tunica vaginalis and the beginning of a sliding hernia of the cecum.

That this is a very rare anomaly cannot be doubted when we consider the practical absence of reference to any similar observations in the literature, as far as this has been accessible to me in a hurried consultation of the Index Catalogue (first and second series) under the head of "seminal vesicle," "spermatic cord," and "hernia." It is the first experience of the kind that I have had in a long surgical experience of over thirty-seven years, in which the surgery of hernia has played a prominent

part. The knowledge that this anomalous prolongation of the seminal vesicles may extend into the cord and complicate an operation for the cure of hernia by its intimate union with the



a *b*

Fig. 456.—Diagrammatic representation of (*a*) normal right seminal vesicle and prostate, viewed from the *posterior* aspect; and (*b*) the abnormal vesicle elongated into a membranous tube which is attached to the vas deferens and prolonged into the scrotum as a part of the spermatic cord.

vas is well worth remembering, if only as an illuminating suggestion in the midst of doubts and perplexities when all other more classical diagnostic probabilities have been considered and exhausted.

CLINIC OF DR. RUDOLPH MATAS

TOURO INFIRMARY, NEW ORLEANS

ARTERIOVENOUS FISTULA OF THE FEMORAL VESSELS (ANEURYSMAL VARIX) ON A LEVEL WITH THE ORIGIN OF THE PROFUNDA. WAR INJURY OF TWO YEARS' DURATION. DISSECTION AND MOBILIZATION OF THE FEMORAL VESSELS WITH DIVISION AND DETACHMENT OF THE ANASTOMOSIS FOLLOWED BY SEPARATE LATERAL SUTURE OF THE ARTERY AND VEIN, WITH PERFECT FUNCTIONAL RESTORATION OF THE CIRCULATION. DETAILS OF TECHNIC AND COMMENTARIES

[Discussion of General Principles, the Methods; "When to Operate"; the Collaterals, and the Prognosis of Arteriovenous Aneurysms, in the light of the lecturer's experience.]

Clinical History (Abstract of Touro Record, File No. 83,633). —John E. B., a machinist residing in Los Angeles, Calif., aged twenty-eight years, was referred as an ex-service man to Dr. Matas by order of the War Risk Board of the U. S. Public Health Service. He enlisted as private in the Marine Corps, 5th Regiment, on December 21, 1916, and in this capacity served during the war. He was "gassed" at Chateau Thierry on June 6th, but recovered quickly and returned to active service until he was disabled by the present injury on July 19, 1918.

On admission to the Touro Infirmary (July 30, 1920) the patient gave the following account of his injury and present complaint:

At the battle of Soissons, France, July 19, 1918, the patient was struck by a small piece of shell which entered the right groin and stuck in the thigh. At first there was no pain; three-quarters of an hour later he felt a stinging sensation. He fell down and pulled down his trousers to examine the wound; he

felt the fragment, removed it with his penknife, and a g of blood followed; he applied a bandage (field dressing) over d and grass to stop the bleeding. He also pressed over the wou with his hand. Four hours and a half later he was picked up a carried to the hospital. He was dressed at the hospital a without further trouble or complication the wound healed i about four weeks. At the end of this time he could walk a litt but suffered some pain. About two months after he had left th hospital he felt a slight thrill over the wound, which slowl increased in intensity. He was seen by several surgeons of th A. E. F. in France and all of them advised against operation (Base Hospital No. 2, Paris; Base Hospital No. 1, Paris; Base Hospital No. 19, Vichy; also Base Hospital No. (?) at Bordeaux). He was finally transferred to the U. S. Naval Hospital, Philadelphia, where he was discharged on S. C. D. March 18, 1920. He has been unable to work since.

Physical Examination.—Has always enjoyed good health until present disability; well nourished and developed. Weight 162 pounds. Height 5 feet, 8 inches. No serious impediment in walking now, but cannot stand for a great length of time without getting weak in the right leg. Cannot flex thigh on abdomen; leg flexes easily; he feels tingling in right leg when walking. Both limbs are symmetric. Veins are visible, but not varicosed more on right than on left. No edema of leg. Palpation shows decrease in pulse of dorsalis pedis and posterior tibial as compared to left side. Inspection of upper thigh shows small linear scar about 1 inch in length lying transversely to the long axis of the limb; the scar is $2\frac{3}{4}$ inches below Poupart's ligament, in a vertical line passing through the middle of the ligament. A slight pulsation is visible at this point, which extends upward and downward along the femoral vessels; the superficial veins above and below the scar are decidedly enlarged when the patient stands. On palpation an intense purring thrill is felt, extending upward along the iliac vessels and downward to the internal condyle. On auscultation, a typical loud systolic murmur at the level of the scar, diminishing in intensity upward and downward along the vessels from the scar. A loud venous

roar is heard, loudest over the scar and disappearing about the umbilicus above, and femoral condyles below. When the tip of the finger is pressed over the scar the pulsations and bruits cease, showing that this is the seat of the anastomosis.

Apart from these local disturbances the general physical examination is negative and need not be detailed except in so far as relates to the heart, which is enlarged, with the apex displaced to the left in the mammary line, with a forcible, visible, beat. No murmurs are heard in the cardiac area, though this is especially listened to for a duplicate apex murmur transmitted from the femoral fistula to the heart (Makins' murmur). Apart from the enlargement of the cardiac area there is nothing to account for the patient's complaint of precordial distress which he has felt at different times since his injury.

The Branham Bradycardiac Phenomenon.—In connection with the cardiovascular history of this patient and in further illustration of the systemic effects of long-established arteriovenous fistulæ on the heart and circulation, no observation made by the patient himself is important. While under observation he watched our procedures for testing the efficiency of the collateral circulation and made some experiments on his own account. One day he called my attention to the fact that on compressing the old scar (which had remained over the seat of the arteriovenous fistula) with sufficient force to stop the thrill and the pulsations he became conscious of his heart-beat and that the femoral pulse above the aneurysm would "slow up" as he compressed the aneurysm. If the pressure was continued a long time, as he tried to do, hoping, in his own way, that it would "still" or cure the aneurysm permanently, he would feel faint and had to desist. I then repeated the experiment and found that his radial pulse would drop quickly from 80 to 60 beats and remain slow but regular as long as the compression was kept up; but if the pressure was continued he would feel faint, and the experiment was discontinued. The blood-pressure, taken simultaneously with the pulse, would rise from 110 s./80 d. The instant the compression was discontinued the pulse-rate would rise immediately to normal and the blood-pressure fall to original

standard. Thus, we had demonstrated by the patient a remarkable phenomenon, which was first observed in 1890 by an American surgeon, H. H. Branham (Internat. Jour. Surg., N. Y., 1890, iii, 250), while investigating an aneurysmal varix of the upper femoral vessels. In this case pressure on the common femoral artery central to the fistula was followed by an immediate slowing of the heart-beat from 80 to 35, with dizziness and dyspnea, until the pressure was removed.

This sign I would designate as "Branham's bradycardiac phenomenon" or sign, since it long antedated the observation made by Wigdorovitsch, who briefly described it independently as an original observation on a Russian War prisoner with a femoral aneurysm in 1915 (Deutsch. Med. Woch., No. 24, p. 71). Since the war this interesting sign has been carefully studied by many competent observers, and its relations with the systemic effect of the short-circuiting of the venous current to the heart through the fistula have added new prognostic as well as diagnostic significance to the cardiovascular disturbances caused by arteriovenous fistulæ of the great vessels.

As the clinical value of this phenomenon and its significance have engaged my attention for some time past, and its discussion has been made one of the subjects of a recent lecture (the Hodgen Lecture, St. Louis Surgical Society, March 26, 1921, to be published at a later date), I will not linger on this important sign further than to confirm its presence in the case under discussion and to associate it with the enlarged heart of the patient as a significant detail in the cardiovascular reactions displayed by these bearers of arteriovenous fistulæ of long standing.

Tests for the Efficiency of the Collateral Circulation.—Before closing with the clinical history and symptomatology of this patient I would state that after the diagnosis of arteriovenous fistula of the femoral vessels at the level of the origin of the profunda had been fully established, special attention was given to the investigation of the efficiency of the collateral circulation as well as this could be determined by, first, compression of the femoral artery immediately above the aneurysm, and, second, compression of both vessels by applying my compressor directly

over the fistula. It was clearly demonstrated that if the limb was completely exsanguinated up to the level of the fistula by elastic compression with an Esmarch bandage and this held *in situ* for ten minutes, while the common femoral vessels were occluded by compression with the special compressor of my device (see Keen's Surgery, Vol. VII), the collateral circulation had developed sufficiently (in the course of the two years that had elapsed since the injury) to maintain a living circulation in the toes, foot, and leg in spite of the complete occlusion of the main vessels. This was demonstrated by watching the hyperemic wave which follows the removal of an elastic bandage and constrictor applied from the toes to the level of the aneurysmal communication. On removal of the bandage (after ten minutes), while the artery and vein were firmly compressed with the pad of my calipers compressor at the seat of the anastomosis, the hyperemic wave was seen to rush down the thigh and leg with characteristic redness to the middle of the leg, then with less intensity over the lower leg and foot, lingering and spreading over these parts and gradually replacing the cadaveric, waxy pallor of exsanguination. In less than two minutes the living color of the foot and toes was uniformly restored, while the aneurysmal thrill, pulse, and bruit were completely stilled by direct compression over the fistula and adjoining vessels. After repeating the test (the hyperemic test, "Moszkowicz-Matas") several times we decided to operate, feeling confident that if it became necessary to ligate the vessels (quadruple ligation, with or without extirpation of the fistulous segment) the collateral circulation would be adequate to maintain the peripheral nutrition.

Therefore, on August 3, 1920, under gas-ether, followed by open ether anesthesia (Dr. Caine), and with the skilful assistance of Drs. L. H. Landry and the resident staff (Holladay, Mossley), and after preliminary disinfection of the field of the operation with ether, benzene, and iodin, the operation was performed in the following stages.

Operation.—*First Step.*—Elastic bandage and constrictor (Esmarch) applied from toes to upper third of thigh. This was

kept in place throughout the operation to drive all the blood out of the limb and diminish venous hemorrhage.

Second Step.—Vertical incision, 6 inches long, 2 inches above Poupart's ligament and down below the apex of Scarpa's triangle. Excision of old scar lying directly over the anastomosis. Retraction of lateral flaps and exposure of the fascia lata, super-

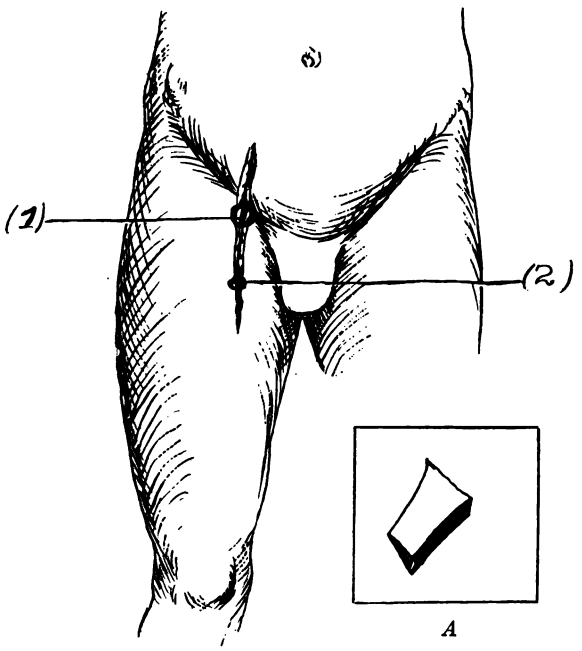


Fig. 457.—J. B. Arteriovenous fistula of the femoral vessels (aneurysmal varix). Incision to expose (1) the common femoral vessels at the groin; (2) the seat of the arteriovenous anastomosis. Insert: (*A*) showing splinter of shell which caused the injury, removed by the patient with penknife; actual size.

ficial veins, and internal saphenous, with lymph-nodes. The smaller vessels were then ligated and the internal saphenous temporarily controlled with elastic ligature. The larger lymphatic glands and superficial fascia removed.

Third Step.—Exposure of Poupart's ligament and the falciform process of the fascia lata; division of the falciform process,

and reflection outward of the fascial flap, exposing the great vessels.

Fourth Step.—Isolation of the common femoral artery and vein, both very much enlarged. The common femoral was as large as the common iliac. Each vessel was secured about ½

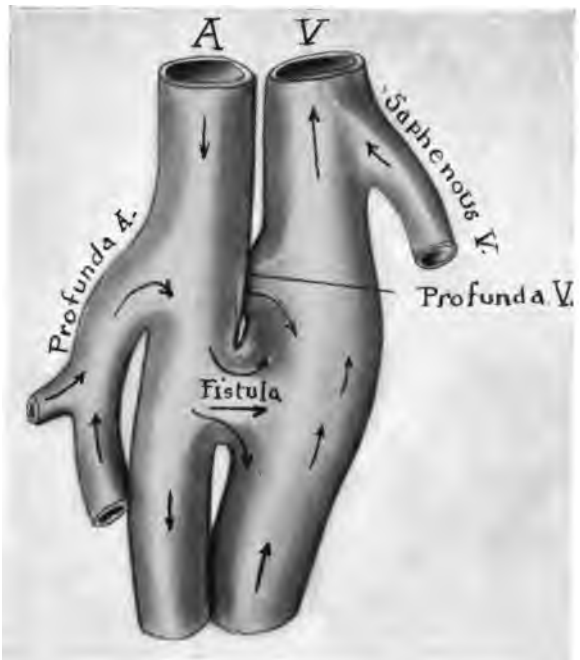


Fig. 458.—J. B. Arteriovenous fistula of the femoral vessels. (Diagram.) To show the close relations of the profunda artery and vein to the fistula. The ligation of the femoral vessels above and below the fistula would not have arrested the circulation in the fistula if applied above the origin of the profunda vessels. Note the dilated artery above (central to) the fistula, and the dilatation of the vein opposite the fistula.

inch below Poupart's ligament with No. 5 (French) soft-rubber catheter, tied over a piece of rubber tubing to protect the vessel walls from pressure damage (Figs. 460, 461). Immediate arrest of pulsation below and almost total suppression of thrill at level of anastomosis. Further dissection of the main artery and vein to the level of the anastomosis, which was recognized as a hard,

callous mass or bridge of scar which was firmly cemented on the vessels, binding and fusing them together in a dense, composite mass. Vessels again identified below the cicatricial plug and

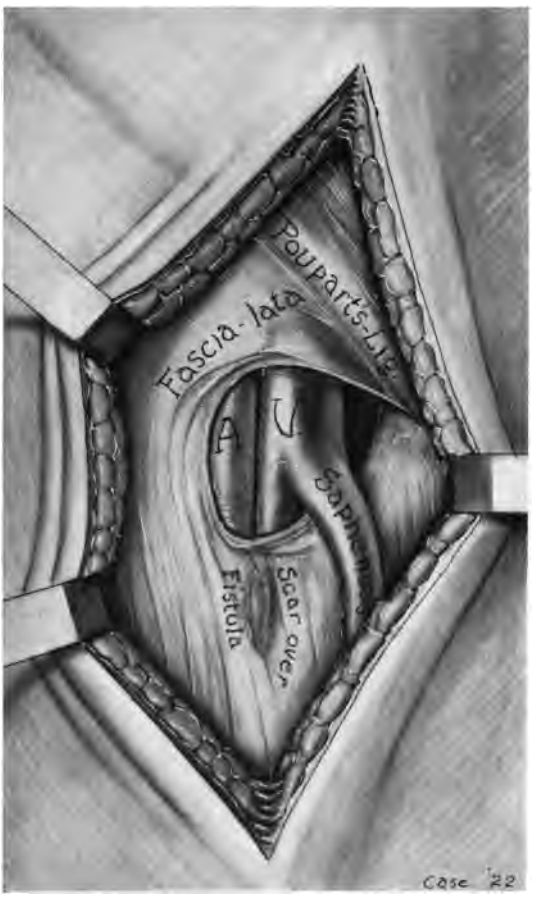


Fig. 459.—J. B. Arteriovenous fistula of femoral vessels. Showing the seat of the fistula, as indicated by a pulsating scar in the fascia lata, immediately below the saphenous opening.

mobilized down to the apex of Scarpa's triangle, where the vein passed under the artery. An elastic (stationer's) flat rubber band, tied around the artery and vein on the *distal* side of the

anastomosis. In spite of this the artery and vein remained

Fig. 460.—Arteriovenous fistula of the femoral vessels. Showing the isolation of the anastomotic communication. Separate clamps applied to the arterial and venous pedicles before division of the isthmus. Note that in spite of the provisional ligation of the main trunks above and below the fistula (with elastic bands over pieces of rubber catheter), the intermediary segments remain distended owing to the influx of blood into the femoral artery and vein. The long saphenous vein is shown clamped.

full, without collapsing, and the artery still pulsated feebly. Evidently the profunda artery was actively feeding the fistula;

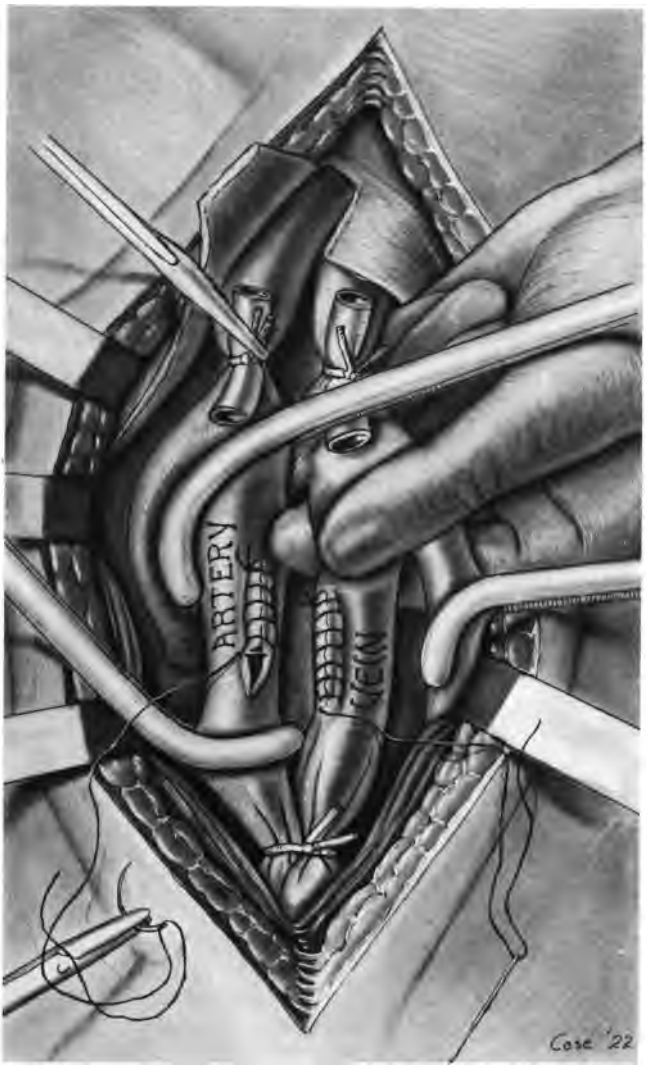


Fig. 461.—J. B. Arteriovenous fistula of the femoral vessels. Shows the anastomotic bridge divided, after exclusion of the profunda artery, by clamping with a soft elastic Doyen (modified) clamp, and by pinching the vein between the fingers. The openings in the artery and vein are *being sutured* with continued fine paraffined silk.

the vein also being supplied by its profunda branch, the internal saphenous having been previously controlled by a clamp.

Fifth Step.—The profunda (quite large) was now recognized at its origin from the common femoral, about ¾ inch from the anastomosis and on the posterior side of the artery. The vein also accompanied it. It was too deep to isolate quickly, and in order to control it a soft elastic bladed (modified) Doyen clamp (flat and curved at the end) was made to compress the artery midway between the origin of the profunda and the fistula, thus effectively preventing the recurrent stream of the profunda from reaching the fistula. As an additional precaution a similar Doyen clamp was applied to the vessel on the distal side of the fistula. A soft, curved clamp was then passed on each side of the anastomosis and between these two blades (lying parallel) the bridge connecting the two vessels was divided. No bleeding occurred on the arterial side when the clamp was released preparatory to suture (Figs. 460, 461).

Sixth Step.—On releasing the clamp from the artery an opening fully ¾ inch in length was exposed. The thick, callous margin of the scar tissue which connected the two vessels was excised, leaving a very short cuff attached to the arterial wall. A small, recent clot was wiped out of the lumen of the artery, which was fully exposed and the interior of the vessel was well lubricated with liquid paraffin. The opening was then closed by a continuous running stitch of fine silk (paraffined) on a small curved ophthalmic needle. On releasing the Doyen clamps which controlled the profunda some bleeding occurred at a few points between the sutures, and an additional silk suture was passed through the thickened adventitia, which closed all the bleeding points absolutely. It was also noticed that a bulge (size of a bead) had developed in the anterolateral aspect of the artery about ¼ inch from the line of suture. The adventitia was very weak at this point through which the media bulged slightly. A few silk sutures were now passed through the adventitia (not perforating the artery) to reinforce the weak spot, and when the sutures were tightened the bulge completely disappeared. Attention was now given to the vein, which still remained quite full,

evidently supplied through the profunda, the long saphenous being well controlled by a modified Doyen clamp. The clamp which held the vein now slipped and considerable flow of blood followed. This was quickly stopped, however, by pinching the vein at the origin of the profunda, the thumb and index-finger of the operator acting as a clamp. With the vein secured in this way the fistulous opening was sutured with a fine milliner's needle. The rent in the vein was quite long—fully $1\frac{1}{4}$ inches. The large size of the opening was caused by the favor shown the artery while dividing the connecting anastomotic bridge. The section had encroached more on the vein than on the artery in order to protect the latter. The opening in the vein was now closed by a continued running silk stitch, leaving the vein practically unaltered and about its normal caliber. The elastic ligature on the cardiac and peripheral sides were now released and all impediments to the venous circulation, including the Esmarch bandage, were removed. Immediately both vessels filled up, the artery pulsating vigorously above and below the line of suture, and the vein likewise filling up to over one-half of its size before the anastomosis was divided. There was no leak in either vessel and the hemostasis was complete. Both vessels were clearly separated and isolated from each other. The artery at the level of the suture line was now buried under the sartorius and adductor longus so that the sutures would everywhere be in contact with muscular tissue. The vein remained partly exposed in the triangle.

Seventh Step.—The falciform ligament was now sutured, giving additional cover to the artery and vein. The area of Scarpa's triangle was also reduced by suturing the sartorius to the adductor high up (Fig. 462).

The wound was closed with interrupted silkworm sutures, leaving a cigarette drain at the lower extremity of the incision.

The hyperemic reaction which had spread rapidly to the toes after the removal of the constrictor left behind it a uniform pink, normal, living color. The pedal pulses were felt just as they had been before the operation. They had always been feeble in comparison with those of the left foot; but by the time the limb

was dressed and bandaged the posterior tibial and dorsalis pedis were felt pulsating more vigorously than before the operation.

The wound was dressed with plain sterile gauze and absorbent cotton, held in place with a spica around the groin. The whole limb was then embaled in a specially thick mattress pad (Matas)

Fig. 462.—J. B. Arteriovenous fistula of the femoral vessels. The anastomosis divided, the orifice in each vessel sutured. The fascial and muscular planes restored.

(Fig. 463) which covered the limb from the toes and foot up to the groin. This effectively protected the limb from pressure, prevented undue flexion of the knee, and allowed the limb to be rolled around whenever the patient desired to change his position.

The behavior of the heart was quite notable and in accord with my previous experience in operations on arteriovenous

aneurysms of long standing. The radial pulse was normal throughout the operation, but a few minutes after the separation of the vessels and the restoration of the circulation to its normal

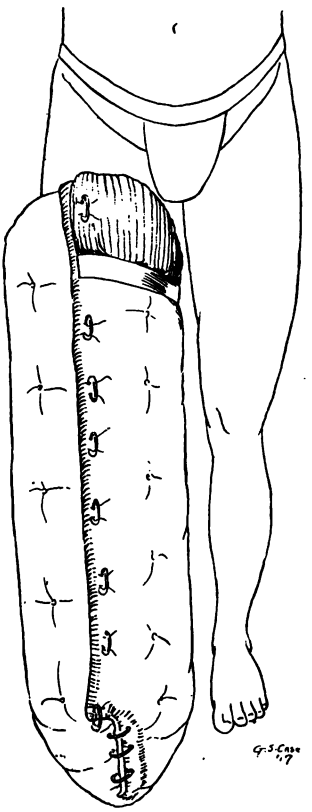


Fig. 463.—The "Matas felt mattress pad" for dressing and immobilizing the lower extremity after aneurysm operation. The pad is adjusted with safety-pins and the dressing is protected from soiling by an oiled silk or thin rubber sheet at the groin. (The pad is applied over the regular sterile dressings. When the pad is adjusted it prevents flexion at the knee, protects against pressure sores, permits frequent inspection of the foot and toes, keeps the distal parts warm and well protected, and allows the patient to roll the limb around at will. No board, plaster, or other stiff splints are ever used.) (Reprinted by courtesy of Messrs. W. B. Saunders Co.)

channel the pulse rose rapidly (after all anesthesia had ceased) from 90 to 110, then 120, and reached the maximum speed of 130.

It remained at this height for about ten minutes, and then began to descend until it reached the level of 118, where it continued after the patient had returned to bed (see Dr. A. Caine's anesthetic chart). At 1.45 P. M. it had fallen to 100.

Postoperative Notes and Commentaries.—In this patient the disturbance of the cardiac rhythm and temporary tachycardia which I have noticed in other similar cases following the fall in the venous pressure in the cavæ and right heart (from the return of the arterial circuit to its proper channels) was marked, but the tachycardia was of brief duration. It is also possible that the sudden displacement of a large volume of blood into the limb on release of the constrictor may have contributed to the post-operative tachycardia through a momentary fall in the blood-pressure.

Apart from an iodin dermatitis in the field of the operation the wound healed without suppuration or complication. Considerable bloody serum oozed out of the drain and, subsequently, from several of the suture points when these were removed. The circulation (color, temperature, and sensibility) of the limb was always normal and never gave anxiety. On August 28th (twenty-three days after the operation) the patient was able to stand on his feet and walk without support. On September 11, 1922 he was discharged, walking out of the infirmary with his wound completely healed and with a perfect functional use of the limb. He was practically convalescent and could have been discharged September 1st, but he remained in the hospital pending arrangements for transportation to his home in Los Angeles.

Discussion.—The operation in this case was, as anticipated, long and difficult, lasting two hours and twenty minutes. In the high femoral and other regions in which absolute control of the circulation cannot be obtained by circular constriction, and only by the control of the individual vessels, the progress of the dissection must necessarily be slow, particularly in old arterio-venous aneurysms, because the temporary occlusion of the main vessels above and below the seat of the fistula is no guarantee of protection against hemorrhage on dividing the fistulous bridge.

If a large collateral is given off from the artery or the vein between the provisional ligatures or clamps, a profuse hemorrhage may be caused by an uncontrolled collateral opening between them (Figs. 458, 460, 461).

It should be remembered that it is only by direct compression of the abdominal aorta above the bifurcation or by mediate elastic circular compression around the waist in thin subjects (Momburg's method) that a completely ischemic field can be obtained in the iliofemoral region. The collateral circulation through the branches of the internal iliac is so copious and quickly established in the upper femoral tract that the compression of the abdominal aorta is the only safeguard against it, and even then the field is still bloody through the uncontrolled epigastric circle. Inexperienced operators who trust the ligation or clamping of the femoral vessels at the groin for the provisional hemostasis, on the presumption that the vessels have been thoroughly controlled by a prophylactic clamping immediately above and below the sac or fistula, are often surprised and confused by the profusion of the bleeding which follows the opening of a varicose sac or the connecting anastomosis of an aneurysmal varix. This liability to collateral hemorrhage is very great in Scarpa's triangle when the arteriovenous fistula is situated at or below the level of the profunda. This liability was particularly well illustrated in this case in which the profunda fed the fistula and kept it pulsating after the occlusion of the femoral vessels above and below the fistula. The profunda vein performed the same function on the venous side. Therefore, even a quadruple ligature applied to the vessels in this case would have failed to cure the aneurysm since the arteriovenous circuit was still flowing through the profunda artery and its satellite vein. Furthermore, the decision as to the method by which the fistula is to be closed cannot be arrived at until the seat of the fistula is clearly exposed and the main blood channels leading to it, including the large collaterals, are absolutely controlled. It was only when the profunda artery and vein were separately secured, as shown in Fig. 460, that the anastomotic link between the vessels could be divided and the orifices of communication

closed without hemorrhage. It is this preliminary dissection that is most difficult and time consuming, especially when the normal anatomy of the parts has been distorted by traumatopathologic processes.

Choice of Methods.—The selection of the procedure depends largely on the condition met in the course of the operations. The operator should be eclectic and capable of meeting the indications as they present themselves. He should adapt his technic to the anatomic conditions as he may find them, and not attack the problem with fixed preconceived notions or set prejudices. There is as much danger in the hands of the ultraconservative, who would insist in reconstructing a hopelessly damaged artery, as in those who would ligate, obliterate, and resect it without regard to the opportunity often presented to preserve and conserve important vascular channels. Such an attitude is just as unreasonable as that of the man who would, on the one hand, attempt to patch up a hopelessly blown out tire, and, on the other, condemn and discard a new tire as useless because it had a simple puncture. In this instance it was possible by the exercise of a little patience to accomplish the cure of a difficult and dangerous arteriovenous fistula by an exceptional method which restored the artery and the vein to their normal physiologic functions.

Methods.—In the treatment of arteriovenous aneurysms we need now only consider the surgical or operative methods. These will vary with the anatomic peculiarities of the fistula whether this be a *direct* anastomosis between the artery and the vein (aneurysmal varix), or an *indirect* communication between the artery and the vein through an intermediary or communicating sac (varicose aneurysm). The methods of treatment that are appliable to arteriovenous aneurysms may be divided into conservative and obliterative. The conservative methods are indicated in dealing with aneurysms of the great vascular trunks: innominate, carotid, subclavian, axillary, brachial. In the lower extremities the iliac, femoral, and popliteal tracts are the most important. In the secondary division of these vessels conservative suture methods are, as a rule, superfluous.

Principles.—In approaching an operation for the cure of an arteriovenous aneurysm there are a few fundamental guiding principles which should be observed:

1. That the cure of arteriovenous aneurysms can only be accomplished by the suppression of the communicating channel or fistula; this feature of the operation is absolutely essential, no matter how it is accomplished.

2. The surgeon should approach an operation for the cure of an arteriovenous aneurysm involving the large vessels in a conservative spirit, so that he may be able to suppress the fistula without sacrifice of the vessels involved. If both artery and vein cannot be saved, then every effort should be made to save the artery, the vein being sacrificed unhesitatingly if by so doing the arterial lumen can be preserved.

3. Under no circumstances should a conservative operation be attempted without the certainty of a prophylactic hemostatic control.

4. In advanced cases involving the large vessels, especially of the neck and groin, a careful and clinical radiologic study of the cardiovascular apparatus is especially indicated to determine the changes that have occurred in the heart in consequence of the short-circuiting effect of the fistula. This is a matter of no small consequence in the prognosis and in estimating the end-results.

5. Before undertaking an operation the surgeon should familiarize himself with the behavior of the peripheral circulation on suppression of the circulation in the main vessels at the seat of the fistula whenever this is accessible to compression. This is particularly important in the carotid, iliofemoral, and popliteal tracts.

With these general principles in mind the procedures will vary according to whether the fistula is *direct* (aneurysmal varix) or *indirect* (varicose aneurysm).

The majority are of the *direct* type (aneurysmal varix). During the war they represented 55 to 60 per cent. of the arteriovenous aneurysms. In my own civilian practice 75 per cent. in over 47 cases that have come under my personal observation, of which 29 only have been subjected to operation.

Thus far I have been able to meet all the operative requirements in this group by three methods: (1) Detachment of the anastomosis, with separate closure of the artery and vein by *lateral angiorrhaphy*; (2) the *transvenous method* of closure by which the fistula is sutured through the interior of the vein (Matas-Bickham transvenous intrasaccular suture); (3) the *quadruple ligature*, with division of the communicating channel to assure the entire separation of the two vessels; (4) in one case only, contrary to the rule, I obtained a complete cure in a subclavian aneurysm by obliterating the subclavian artery with an aluminum band immediately above and central to the fistula. This was done only as a preliminary to a more radical operation, but in view of the immediate stilling effect of this band it was allowed to remain and no further procedures were necessary to confirm a permanent cure.

As I have gained in experience and confidence in my technical resources I have found that the ligature, with or without extirpation of the fistulous tract, is less and less indicated or necessary. In so far as my experience in the last few years is concerned the quadruple ligature with resection of both vessels has become an almost obsolete practice. I fully recognize, however, its undoubted value and importance as an unavoidable procedure and as a necessity in some cases, in emergencies, and in the secondary or smaller branches in which the preservation of the main channels of the circulation is not essential or necessary.

In practice I have found that the transvenous approach to the fistula and its closure by an intravenous suture has proved the most satisfactory and generally applicable in its various manifestations, since it was first suggested and described by my friend and former associate, Dr. W. S. Bickham, of New York, in 1904, as an extension and adaptation of my intrasaccular suture (endo-aneurysmorrhaphy).

The *transvenous suture* is indicated and is especially applicable to aneurysmal varices of long standing with circumscribed sacculation or generalized dilation of the communicating vein at the seat of the fistula. While the detachment and separate suture

of the artery and vein by lateral angiorrhaphy, as illustrated by this present observation, is the ideal method, this is usually practicable only in very recent injuries in which the adhesions binding the inosculating vessels are not so dense and intimate as to preclude the detachment and mobilization of the communicating vessels. When the anastomotic vessels cannot be easily detached the transvenous approach to the fistula often accomplishes the cure of the varix in a way that is easier and safer than by any other procedure. It obviates the necessity for the quadruple ligature, with or without section of the anastomosis or the resection of the arteriovenous ampulla or sac. It is also very superior in its simplicity to the resection of the anastomotic segment followed by the end-to-end suture of the divided vessels, the so-called "ideal" operation so extensively practised by the German surgeons in the late war.

The essential feature of the method is the closure of the arteriovenous fistula by a continued paraffined silk suture, as the opening is clearly exposed to view by a free incision through the opposite wall of the dilated vein. The aim is the preservation of the artery; the fate of the vein is of secondary importance. When the vein is detached it is usually possible to save both vessels. The technic is susceptible of several modifications which adapt the procedure to variable conditions found in individual cases (DaCosta, Pearson, Makins, Connors, and others, practically all of these having been anticipated by Bickham in 1904). One of the modifications which I have found generally most useful is to close the fistula by intravenous suture, allowing the sutured section of the venous wall to remain attached to the artery as a graft, and ending by a separate suture of the vein from without as in an ordinary phleborrhaphy. The various methods are described and illustrated in my articles in Keen's Surgery, Vols. V (1908) and VII (1921), and in a paper in the Annals of Surgery, April, 1920. Since this paper was published I have had other experiences which confirm my belief in the value of this method, to be reported at a later date. Dr. Connors, of New York, has reported 10 additional cases from his military experience during the war which are reported and illustrated in

the proceedings of the Surgical Section of the Amer. Med. Assoc. for 1921. Sir George Makins, in his admirable monograph on the War Injuries of the Blood-vessels, extols this method (without mentioning its source) as applied by himself and other British surgeons.

It is regretable that a method so frequently applicable, so relatively simple and safe should have remained unknown or ignored by the great majority of European surgeons, notwithstanding the fact that a full description of the method and its technic had been given to the profession by Bickham and myself in our several publications ten years before the great war of 1914.

Apart from the venous approach, which is indicated in the direct arteriovenous fistulæ, the intrasaccular suture (endo-aneurysmorrhaphy) is unquestionably of great service in the treatment of *varicose aneurysm* in which the arteriovenous communication is established indirectly through a sac. In these cases the adventitious or false sac is opened freely and all the orifices in the sac are closed by separate suture. Sometimes the artery may be successfully restored or reconstructed in the sac, as was done by Beckman at the Mayo Clinic in 1909. The sac itself is obliterated by plication or infolding of the sac walls or in any other way suggested for the obliteration of dead spaces. Packing the sac with iodoform gauze soaked in compound tincture of benzoin after suturing of all the orifices and completing the hemostasis I have found the best treatment in suppurating or septic cases.

The methods of intrasaccular suture are able to cope with a large majority of arteriovenous aneurysms in which the circulation in the communicating vessels can be absolutely controlled, as in dealing with pure arterial sacs. Endo-aneurysmorrhaphy has the great advantage of closing all the orifices of the collaterals opening into the sac whether arterial or venous, at their terminals in the sac, without disturbing their extrasaccular connections.

When to operate an arteriovenous aneurysm is a matter for serious consideration. They are all traumatic, caused by gunshot, stab, or punctured wounds, which usually permit of the provisional or temporary hemostasis by simple methods of

occlusion, pressure bandage, or skin suture, thus giving time for a mature and deliberate operation. While in all cases the aim of the surgeon should be to at least save the artery, this is not always possible, and double or quadruple ligature may become necessary as an unavoidable necessity. This possibility should always be borne in mind before deciding upon *the time* for the operation. Gangrene and the disastrous ischemic effects of ligature are due chiefly, if not wholly, to insufficient collateral circulation. Therefore, all operations upon the blood-vessels on shocked, exsanguinated, and exhausted patients in whom the compensatory cardiovascular mechanism is profoundly inhibited should be avoided. While from the purely technical point of view the best time to operate should be in the early or hematoma stage, when the communicating vessels are easily detached, isolated, and sutured, it may also be the worst physiologic moment, if through an unavoidable necessity a ligature may have to be substituted for the suture. It is, of course, different in contaminated wounds, as in the shell injuries of the late war. Here débridement or surgical cleansing becomes a necessity, and it is evident that if the patient is at all fit to undergo this procedure the proper treatment of the vascular injury should claim as much, if not more attention, in a conservative sense, than the fractured bones, wounded joints, nerves, etc., which were so much benefited by the surgical sterilization practised in the late war. As a whole, my experience in the treatment of wounds of the blood-vessels caused by bullet wounds, punctures, stabs (which are usually aseptic) in civil practice is in favor of delay; not only until the patient has recovered from the effect of shock, hemorrhage, and exhaustion, but weeks and months after, when the local reactionary effects of the trauma have passed away and the normal anatomic condition of the tissues is restored. This is not a matter that can be decided by arbitrary rule or by the calendar. When it is clearly demonstrated that the circulation of the peripheral parts is maintained after the temporary occlusion (with the compressor) of the main artery, or preferably by the occlusion of the artery and vein at the seat of the fistula—*that, then*, is the right time to operate. Then if the ligature should

become necessary in spite of the best efforts to preserve the continuity of the injured vessels, and especially the artery—the prospect of a successful cure will be infinitely greater than if the operation had been undertaken hastily and without adequate preparation. Information should be obtained of the efficiency of the collateral circulation *before* the operation is undertaken, if possible, and not during the operation itself, when it is often too late to profit by the several tests which are applicable solely intra-operationem.

Training the Collaterals.—Contrary to the opinion of many surgeons, I believe in the possibility of developing the collateral circulation by adequate systemic and regional treatment in suitable cases. I have had ample proof of this and have confidence in the effects of compression of the main artery if systematically applied above the lesion, or preferably, in arteriovenous aneurysms, at the seat of the fistula itself, with the hot-air cabinet, alternating hot and cold baths, and massage, in fact, any means of inducing artificial hyperemia of the peripheral parts as a preliminary in all doubtful cases.

The **prognosis** of arteriovenous aneurysms has been considerably modified of late, with increasing knowledge of the systemic effects of arteriovenous fistula upon the heart and circulation. The effects of short-circuiting the arterial current into the venous system when a fistula is created in one of the great vascular tracts is to overtax and finally cripple the heart after a variable period of hypertrophic compensation. In addition to the disabling effects of the varicosities and ulcers which develop on the extremities and other well-known trophic lesions caused by arterial anemia, the graver, but less known dilation and progressive organic changes in the leaking artery on the cardiac side of the fistula, so well demonstrated by W. S. Halsted and his pupils, have changed the traditional benign character with which arteriovenous aneurysms have been credited in the past. The secondary and disabling cardiopathies which recent clinical and experimental evidence have brought to light suffice to justify the more aggressive attitude of modern surgery toward these aneurysms at the present time.

Some references to later publications by Dr. Matas on arteriovenous aneurysms and other correlated subjects referred to in this lecture:

1. *Surgery of the Vascular System*, Keen's Surgery, vol. v, p. 350, Philadelphia, 1909.
2. *The Suture as Applied to the Surgical Cure of Aneurysm*, Sect. of Surgery, 17th International Medical Congress, London, 1913 (with Statistics of Endo-aneurysmorrhaphy to 1913), Trans. of the Section of Surgery, London, 1914.
3. *Testing the Efficiency of the Collateral Circulation as a Preliminary to the Occlusion of the Great Surgical Arteries* (with special reference to the author's methods), Jour. Amer. Med. Assoc., October 24, 1914, vol. lxiii.
4. *Some Experiences and Observations in the Treatment of Arteriovenous Aneurysms by the Intrasaccular Method of Suture* (Endo-aneurysmorrhaphy), with special reference to the Transvenous Route (a summary), Osler Anniversary Volume, vol. ii, Hoeber, New York, 1919.
5. Idem. (revised, with additional notes, in Annals of Surgery, Philadelphia, vol. 71, April, 1920).
6. *Endo-aneurysmorrhaphy:* (1) *Statistics of the Operation;* (2) *Personal Experiences and Observations in the Treatment of Arteriovenous Aneurysms, etc.*, Trans. South. Surg. Assoc., 1919, vol. 33, and in Surg., Gyn., and Obst., May, 1920, vol. 30.
7. *Military Surgery of the Vascular System*, Keen's Surgery, Supplementary vol. vii, 1921 (see chapter on The Treatment of Aneurysms and Arteriovenous Aneurysms as Influenced by the Experience of the Late War, p. 807 et seq.).

CLINIC OF DR. WILLIAM D. HAGGARD

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EXOPHTHALMIC GOITER

THIS patient is a single woman, forty-nine years old, who has been a waitress for nineteen years. She represents in a very comprehensive way the whole story of exophthalmic goiter. Her appearance is most typical and her case presents many of the problems in this weird disease. I show her to you now that the majority of them have happily been solved. She had the characteristic goiter, bulging eyes, tremor, weakness, and nervousness. She was entirely well and strong up until 1912. The first thing noticed was a rapidly developing bulging of the eyes, and in two and a half months the lids could not be closed even by force. Soon after that she became very nervous, irritable, and trembled all over, especially in the legs. She soon became quite weak characteristically in the knees and began to lose strength and weight. The heart was very rapid. At the end of the first month an enlargement appeared at the right side of the neck closely followed by a similar enlargement on the left. This enlargement moved on deglutition and increased rapidly in size and soon was almost as large as two fists. In five months' time, in addition to loss of much strength, she had gone down 40 pounds in weight.

Under medical treatment and rest she is said to have improved slowly and became much better. She was given iodin internally and red precipitate was applied externally. She was up and down in bed for fourteen months, but at the end of three years she says her condition was almost normal. Her eyes became much better. The tumor went away except for a small enlargement. Her nervousness was much better and

weight returned almost to normal. She went back to work, having no symptoms except so-called "heart trouble," which caused her to lie down for an hour or a whole day at times for relief.

In November, 1920 tachycardia began coming in paroxysms, especially after exertion, and was associated with pains over the precordium and a marked dyspnea. Soon all of her former symptoms returned. Exophthalmos again became pronounced and the goiter increased rapidly and a marked pulsation developed. Nervousness, restlessness, irritability, loss of strength, loss of weight (29 pounds), insomnia, and tremor became so marked now that she was unable to work. She never had nausea, diarrhea, or jaundice, although she had a little gaseous indigestion at times.

Menopause uneventful one and a half years ago.

Had typhoid fever in 1893. Malaria in 1901. Pneumonia in 1898 and 1919. In 1908 injured abdomen in bad fall, with resulting pains for three years.

Physical examination (July 5, 1921): Poorly nourished white woman with marked evidence of loss of flesh. Weight about 90 pounds. Skin is sallow. Cranial nerves are negative. Exophthalmos is marked, 4+. Tongue protrudes equally and has a fine tremor. There is a symmetric enlargement of both lobes of thyroid, 3+ (Fig. 464). Growth is firm, moderately hard, and moves upward on deglutition. Pulsation is noted on either side. No thrill is felt, but small scar above left superior pole. Lungs negative. Heart slightly enlarged ¼ inch to left of nipple line, P. M. I., sixth interspace. No murmurs are heard. Sounds are of fair quality, moderately loud, irregular at irregular intervals, with some variations in the character of the beat. Somewhat rapid (96 to 100 per minute). Examination otherwise negative. Positive findings were (1) goiter 3+, (2) exophthalmos 4+, (3) tremor, (4) tachycardia, (5) myocardial degeneration, (6) apparent loss in weight of 31 pounds.

Urine and blood were negative.

Basal metabolism: Height 5 feet, 4 inches. Weight 86 pounds, rate +30 per cent. On July 26, 1921 the left superior

thyroid artery was ligated under local anesthesia and light nitrous oxid analgesia. She had been in bed one week with abundant fluids and nourishment and alkalis internally. Digitalis was given to stabilize her damaged heart, and in one week pulse was down to 90 and quite regular. At the beginning of the operation the pulse went up to 120 and at the end was 124. However, in eight hours the pulse was 138 to 144 and quite

Fig. 464.—Exophthalmic goiter.

irregular. Temperature was 101° F. She had a fairly severe reaction. This was combated by saline solution subcutaneously, glucose 10 per cent., soda bicarbonate 2 per cent. by proctoclysis and morphin, while the temperature was controlled by ice-bags and electric fan. In four days the pulse was 90. During the eleven days prior to her leaving the hospital she had one of those gastro-intestinal crises with inability to lie on the right side,

which we interpreted to be of cardiac origin. Having ligated the larger throbbing, right superior thyroid, and not wishing to overburden the damaged heart, and on account of her very severe reaction we thought it best to postpone the ligation of the opposite side and give her an *x*-ray irradiation instead.

After one month in the country she had improved very much on complete rest in bed, fresh air, quietude, and good nourishing food. She had gained about 10 pounds in weight and felt much stronger. After absolute rest in bed for one week in the hospital pulse was 80 and temperature was 100° F., and after preliminary nitrous oxid test, left thyroidectomy was done September 9, 1921 under local and light nitrous oxid analgesia. Wound was packed open, as pulse was 160 and quite irregular at end of operation. I feel confident that a complete thyroidectomy would have been too much for her. On the following day in the patient's room, under nitrous oxid anesthesia, packing was removed and skin closed with clips. Reaction was moderately severe, but she responded to cold applications and abundant fluids and morphin. Temperature and pulse quieted down in four days, and in two weeks she was much improved and had gained much strength, although her heart continued to be quite irregular at intervals.

September 28, 1921 a subtotal thyroidectomy of the remaining right lobe was done under local and nitrous oxid analgesia. At the beginning of the operation the pulse was 144 and at the end was 144. Wound was packed open with gauze and not closed. Patient had a rather severe reaction. Temperature maximum reached 102.2° F. the following day, and pulse was so irregular that we were unable to count them. She was vomiting everything. Digitalin, gr. $\frac{1}{25}$, was given every four hours for eight doses, together with abundant morphin and fluid subcutaneously. Ice-bags and refrigeration were used over the heart and head until temperature and pulse came down on the third day after the operation. September 31, 1921 in the patient's room nitrous oxid anesthesia given and the packing was removed and the muscle and skin closed.

The wound healed nicely and convalescence was uneventful.

Patient left the hospital eleven days after the last operation. She gained in strength and weight rather slowly. Two months after going home had some arthritis of ankles, which cleared up in about two weeks. Since that time patient has been about accustomed duties, feeling fine except for occasional "heart spells," which are becoming less frequent. She has resumed her occupation as waitress.

This case illustrates most strikingly the desperate plight of these advanced and neglected cases of exophthalmic goiter. It proves the wisdom of the fractional method of handling them. Operating upon a case like this is like walking on a basket of eggs. No gentleness in operating and no advantage given by medical means can be neglected. The important thing is the graduated operation. I have enumerated all of the vicissitudes through which we went in order to show just how close one has to go to the brink of the precipice in treating such cases; and this is true, because misapprehension causes them to delay consultation until such forbidding symptoms have presented themselves on account of much misapprehension existing about these cases, on account of the delay and the forbidding symptoms which they present when they finally come under the surgeon's care.

It is not generally appreciated that exophthalmic goiter is absolutely a surgical disease. Men who pride themselves on never having a case of appendicitis which they have seen in the beginning go to abscess, do not act so promptly with this insidious disease. Many make the mistake of administering iodin indiscriminately, which is a most serious error. It is bad in exophthalmic goiter, but, as a rule, the symptoms become so much exaggerated that the patients themselves discontinue using it. Unfortunately, in the elderly patients with adenoma of the thyroid that has been carried for years the result of the administration of iodin is more insidious and is only realized when we find that the apparently quiescent goiter has been stimulated into pathologic action and we have resulting toxic symptoms; the so-called iodin—Basedow. Every physician should realize the menace of iodin in this type of goiter just

as he does the danger of purgation in appendicitis and intestinal obstruction.

One contemplates the successful management of a case of this sort with a great deal of satisfaction. I wanted you to see her before the next case is operated upon as an example of the exquisite gentleness and nicety of the supervision which is so essential in these desperate cases.

DIVERTICULITIS OF THE SIGMOID

THE case which is now about ready for operation we have diagnosed as diverticulitis because of the following history:

No. 13,503. Mr. C. H. P. is a married man forty-six years old. He is a farmer. His present illness began four or five months ago, when he began to have attacks of lower abdominal colic. At first the spells of colicky pain were confined to the left iliac region, but as they increased in number the pain seemed to get higher and higher and to radiate more around toward the left side of his back. These spells were associated with a collection of gas which the patient could hear rumbling around. During an attack he usually takes an enema, which enables him to pass a great deal of gas, and in that way affords relief. Occasionally there is rather severe aching pain in the left testicle. There is a sensation as though "the gas" was pressing on the bladder. Associated with the colic he has some frequency of urination, but no especial urgency. Never passed blood or pus in the urine. There is no burning or pain on urination. These spells have no relation to meals. They usually last from thirty minutes to two hours. As a rule, they come in the evening after getting home from work. He has a spell on an average of once a week. In the intervals has no indigestion or other discomforts. On account of the trouble with gas he went on a diet a month ago, and has not had a spell for the past three weeks, until last night, when an attack came on following a dose of salts. After these spells he complains of a soreness in the left iliac region. Recently this soreness has extended around into left side of his back. There has never been any fever with these spells. Practically always gets relief from an enema, and after his bowels have moved, a hot-water bottle over abdomen. Never has taken morphin. He suffers with constipation considerably.

He has lost 50 pounds since January (six months), which he feels is due to being afraid to eat. He has never had typhoid fever. Fifteen years ago had chills and fever all one summer. Inguinal hernia as a child. No sign of it now. Has a nervous temperament.

Patient is the father of 5 children, all in good health. The oldest is twenty-one and the youngest six.

Fig. 465.—Diverticulitis of sigmoid.

Family history negative.

Physical examination: Patient is a large man, slightly overweight. He is well developed. Nose and throat negative. There is some evidences of pyorrhea. Chest is negative. Abdomen is pendulous. The viscera can hardly be made out by palpation. There is a tender area in the left iliac region which extends around to the back in the region of the left kidney.

There is a palpable mass in the left iliac region. There are no other findings, the lower extremities and reflexes being negative.

This case was diagnosed appendicitis by one of the best internists in an adjoining state. The mass in the left side and the history are very significant of diverticulitis. Unfortunately, we couldn't get an *x*-ray picture of this case on account of the intolerance of the intestine for the enema, but I am showing you a very beautiful picture of a former case (Fig. 465).

Fig. 466.—Diverticulitis of sigmoid.

Now that the incision has been completed we encounter a dense, hard induration of the entire sigmoid. It is attached down as far as the bladder. I don't seem to be able to mobilize it. You can see the large swelling of the epiploicæ, which is apparently due to chronic infection. I do not believe it is malignant. However, I would like to treat it as such. If it were possible to bring up the whole growth on to the abdominal wall and outside I would do a Mikulicz operation, which, of course, is the safest of all operations on the sigmoid. As it is, we will be obliged to resect this growth. The mass

that we have removed, as you will see, is about 8 inches long (Fig. 466). The left ureter is in plain view now that the mass is out. I shall introduce this colon tube through the rectum beyond the line of resection and into the lower end of the upper segment. I shall attach it to the wall of the upper segment. Over this tube I shall invaginate the walls of the sigmoid and perfect an anastomosis. On account of the considerable difficulty in closing the colon I am going to put in two cigarette wicks in case there is any leaking. The operation has been extremely difficult on account of the immobility of the growth and the resulting difficulty in approximating it end to end. Still it is satisfactory.

Diverticula are really small herniæ of the wall of the bowel. They may be congenital. Depending on whether or not the wall of the diverticulum contains all the coats of the intestinal wall, it is "true" or "false." False diverticula are usually acquired. They may occur in any portion of the intestinal tract. They are most common in the sigmoid and at the rectosigmoid junction. They may be single, but most often are multiple. There may be any number of them. In one reported case there was 400. Usually the process is confined to a small portion of the sigmoid, but many portions of the colon may be involved. Sometimes diverticula involve a considerable length of intestine, occasionally several feet. These diverticula vary greatly in size, some of them being exceedingly small. Their contour is also variable, and any part of the circumference of the bowel may be affected. They are most common at the mesenteric border and about the appendices epiploicæ. According to Masson, they have been found most frequently between the mesocolic and lateral muscular bands.

Diverticula are minute "blow-outs" of the bowel wall. Their etiology is attributed to a number of factors. The point where a blood-vessel pierces the intestinal wall is somewhat weaker than the rest of the circumference and more suitable for the development of these small blow-outs. The colon with its multiple sacculations and abundant supply of subserous fat is particularly predisposed to out-pouchings of its wall,

especially if there is undue pressure from hard feces, as in constipation. Increase in gas tension is an obvious physical factor. Foreign bodies may play a part, and infarction of the intestinal wall would form a weak point. Inflammations of the colon may predispose. Any wasting disease may indirectly become a factor, inasmuch as it may cause a loss of tone in the wall of the bowel. On the contrary, obesity, by increasing the amount of subperitoneal fat, decreases the vitality of coats of the intestine. One always finds in cases of diverticulitis a large quantity of fat surrounding the lesion. The appendices epiploicæ are greatly increased in size and number, and become glued together in an enormous tumor which surrounds them. Diverticulitis occurs twice as often in men as in women, and most often after the fortieth year of life.

It is relatively rare; 83 diverticula were found in 13,068 reported autopsies, 39 of these were congenital and 44 acquired.

Small diverticula may be symptomless for years or never produce symptoms. Sooner or later, however, they usually become infected. Infection is the foundation of their symptomatology. Diverticulitis is most often met with in the left iliac region. In Masson's series of 112 operated cases it was found in the sigmoid in 93 instances. The symptoms are similar to those of appendicitis. It is "left-sided appendicitis." The pathology is practically the same as a diseased appendix. The infection may extend from a pure diverticulitis to become a peridiverticulitis. Then these numerous epiploicæ become glued together around the inflamed diverticula forming a relatively large tumor, as happened in this case, which can be easily palpated through the abdominal wall. The presence of a mass with pain, soreness, tenderness, and rigidity are the local symptoms. Intestinal symptoms vary, of course, with the position of the diverticula and the pathology present. When the process is low there is pain on defecation and constipation. There may be a varying degree of obstruction due to fibrous contraction from chronic inflammation.

These cases are essentially chronic, with periods of acute or subacute exacerbations. In the chronic cases the diag-

nosis is sometimes difficult. The condition is sometimes mistaken for tuberculosis or syphillis, but most often for cancer. Indeed, it is very difficult, many times impossible, to distinguish it from cancer. It develops at a point where cancer is common and it comes at the cancer age. It produces a mass that can be felt, without acute symptoms and indefinite intestinal disturbances, perhaps painful defecation, some degree of obstruction, and occasionally some blood in the stools. Of course in diverticulitis there will be little loss in weight and no cachexia. Such symptoms must not be waited for, however. In other words, if the condition were cancerous a diagnosis should be made before weight loss and cachexia become apparent. These cases are usually well nourished and look exceedingly well. The differential diagnosis between diverticulitis and cancer in many instances can only be made microscopically. Moreover, these two conditions are often associated, malignancy developing at the site of a chronic diverticulitis.

If the lesion is below, it can be reached by the sigmoidoscope. Even then it is very difficult to identify the process as diverticulitis. More often one can demonstrate evidences of inflammation and a certain amount of constriction from fibrosis.

A good *x*-ray picture will locate the lesion for you, but it will not always reveal its pathology. Sometimes, as has been brought out by Carmen, isolated rings of bismuth filling the cavity of the diverticula will betray its true character.

If left alone these patients may suffer an acute attack at any time during which one or more of the diverticula may become gangrenous and rupture into the peritoneal cavity. The result is a localized or diffuse peritonitis. The diverticula may drain themselves into the lumen of the bowel. They have been known to rupture externally, with the formation of many sinuses. Sometimes they become adherent to a viscus and subsequently perforate into it. A fistula may develop, the most common one being between the sigmoid and bladder.

I think on account of the adhesion to the bladder in this case that a fistula might have formed.

Pathologic examination demonstrated the specimen to be the seat of multiple diverticula which are in various stages of acute and chronic inflammation.

Postoperative convalescence was uneventful, with the exception of slight fecal drainage, which developed on the seventh day and stopped again on the eleventh day.

SARCOMA OF THE SPLEEN

THE next case is interesting. We removed the spleen for sarcoma. The patient is convalescent. I will read the history.

No. 12,956. Mrs. L. A. This patient is a married woman, forty-nine years of age. Her present trouble began six years ago with sharp pain in the left side of her back, which would radiate around to the front. The pain, though sharp, was not severe at first, and was not associated with nausea or vomiting. It has gradually grown worse. At present most of her pain starts low down in the left side of her abdomen and radiates up under the left costal margin. The left upper quadrant hurts her all the time. Has to keep under the influence of aspirin. Takes three or four tablets each day. Two years ago patient first noticed a swelling in the left upper abdomen. It could be seen and felt. Had fever at that time with this illness and was in bed for two weeks. After getting out of bed her side (left splenic area) continued to pain her and the swelling persisted. She was admitted to the Nashville City Hospital in November of last year for treatment. Her case was exhaustively studied and we have verified these findings. She remained there five weeks, but her condition did not improve. She was in bed continuously while in the hospital. She became very weak and lost a great deal of weight. Complained of sharp, darting pains along left costal margin and in left lumbar region. Has never had any stomach trouble. She has gradually gotten pale. Yesterday had severe pain in left upper quadrant. Cried out with it. When she has severe pain like this her color becomes slightly bluish and especially so in her finger-nails. Has never passed blood from the bowels. Has become nervous recently and complains of a cough for the past few days.

In 1912 this patient had rheumatic fever, which left her crippled, especially in the left hand. She was sick nearly two years with this illness. Twenty-two years ago had malaria.

For the past six years she has had no period. Up until this time menstruation was normal. No discharge of any sort at present.

She is the mother of 9 children, 4 of whom are dead; 5 are living and well. The youngest is fourteen and the oldest twenty-four. Has had one abortion.

Family history is negative.

Physical examination: Patient is tall, well developed, but extremely weak, and shows signs of emaciation. Her color is very pale and the mucous membranes show rather marked anemia. Left upper quadrant was tender to pressure, also the left lumbar region. There is a movable mass in this region which we thought was an enlarged spleen. Other findings were normal and uninteresting.

The urine was negative.

Cystoscopy was done to rule out tumor of the left kidney. Patient had a large cystocele which interfered with the examination to a certain extent. With the exception of a slightly large pelvis the left kidney was found to be normal in every respect.

Blood examination: Hemoglobin, 55 per cent.; R. B. C., 3,350,000; W. B. C., 8600.

Differential blood count: Neutrophils, 67 per cent.; small mononuclears, 25 per cent.; L. M., 3 per cent.; E., 5 per cent.

Blood-smear: Negative for nucleated red cells. Red blood-cells were of normal appearance.

Wassermann was negative.

Stool examinations revealed no parasites.

x-Ray study: The entire genito-urinary tract is negative to stone. Stomach fills well and shows no deformity. The duodenum is negative. The colon shows no evidences of tumor. The dorsal spine from the eighth vertebra downward is normal. There are no gall-stone shadows. The spleen is enlarged, its lower border showing 2 or 3 inches below the left costal margin.

During the period in which these examinations were made the patient's temperature and pulse-rate remained normal except on one occasion her temperature went up suddenly to 102° F., and her pulse-rate was increased to 118. The following day,

however, the patient was normal again. A tentative diagnosis of tuberculosis of the spleen with secondary anemia was made by us.

At operation the spleen was exposed by a high left rectus incision. It was found to be considerably enlarged, almost twice its normal size. It was adherent to the anterior and lateral abdominal wall over an area 5 inches in diameter. The spleen was, therefore, delivered with difficulty, after which the pedicle was found to be in a semicaseous condition and adherent to the fundus of the stomach (Fig. 467). In separating the stomach a

Fig. 467.—Sarcoma of spleen.

small opening was made in its greater curvature. This opening was closed without leakage by a double row of catgut sutures which was surrounded by purse-string and invaginated so as to obliterate all raw surface. The portions of the spleen adherent to the viscera and abdominal wall were necrotic, caseous, and of very foul odor. The spleen was next removed and its space drained by a rubber tube inserted through a stab-wound in the midaxillary line. Bleeding from needle pricks was controlled by leaving two forceps clamped on the pedicle. These were removed after forty-eight hours.

The pathologic examination showed sarcoma.

Her postoperative convalescence was uneventful except for wound infection. There was considerable foul-smelling purulent discharge from the wound for nearly four weeks. It gradually lessened with daily dressings and irrigations. She gained strength very slowly, but was able to leave the hospital six weeks after operation.

Since her operation she has had irradiation with radium and *x*-ray.

This case is an example of a very rare condition. Goldstein, in an exhaustive review of all the literature up to the present time, could find only 66 cases.

New growths of the spleen must be of the connective-tissue type. Sarcoma of the spleen is the only primary form of malignancy to be met with. Moynihan says that there is no reported case of carcinoma which will bear investigation. The spleen is even less often the site of secondary growths. In advanced cases of malignancy with wide-spread metastases the spleen remains uninvolved. When cancer is transplanted in splenic tissue it thrives as it does elsewhere in the economy. It can, therefore, not be a question of media. The reason lies in the fact that the spleen is an organ devoid of lymphatic connections and the routes of malignant invasion are consequently confined to direct extension or to the blood-stream. It is estimated from autopsy experience that even in cases of wide-spread malignant degeneration the spleen is involved in less than 1 per cent. of the cases.

Sarcoma may spring from one of three types of splenic tissue, the trabeculæ or connective tissue, the splenic pulp, or the endothelial cells of the lymph-spaces. According to Ewing, the character of the growth is modified to a certain extent by the type of tissue from which it grows. In other words, a sarcoma of connective-tissue origin is ordinarily a circumscribed growth within the spleen, or it may even be pedunculated, whereas the spleen is enlarged as a whole in cases of lymphosarcoma, which grows from the pulp cells. A nodular spleen is found in cases of endothelial sarcoma. The first type

is more or less benign, whereas the lymphosarcoma and endothelial sarcoma metastasize rapidly.

Benign tumors of the spleen are occasionally met with, and there are a very few cases of carcinoma of the spleen reported in the literature, but the data we have been able to get in these cases is incomplete.

A diagnosis of sarcoma of the spleen is exceedingly difficult to make during life. In a few instances a preoperative diagnosis has been established. However, a definite diagnosis sufficiently early to render an operation at all curative is impossible. Its anatomic position militates against a very satisfactory examination. A tumor or enlargement in the splenic area is the cardinal point. When this enlargement is found to be spleen, which may not be difficult because of the tell-tale notch, the chief evidence has been established. Pain is to be expected, but cachexia comes too late to be of any value. It is then merely a process of eliminating other diseases—syphilis, malaria, Banti's disease, etc.

However, we are rapidly reaching the point where we believe that an enlarged spleen from any cause should be removed. We know it is in nowise essential to health, and when diseased its existence becomes a menace to life. Removal of the spleen from a technical standpoint is not a difficult operation. However, in a practical way the diseases which demand such a procedure often render splenectomy not only hazardous, but hard to perform. The mortality has been considerably reduced by modern technic and the more general use of blood transfusion. Bush in 1910 found 34 cases of sarcoma, 13 of whom were splenectomized. Of the 13, 4 died primary deaths, and 4 may be considered as cured. Mayo's case was well six years after operation. From past experience I think we can expect as good end-results from surgical treatment in sarcoma of the spleen as we have had in malignancy in general, possibly better.

SUBDIAPHRAGMATIC ABSCESS

THIS patient, now taking the anesthetic, is a blacksmith by trade and thirty-five years old. His present history began five days before his admission to the hospital, at which time he was taken with a very severe pain in the pit of his stomach. The pain developed about 5 o'clock in the afternoon and was cramping or colic-like. Pain got worse gradually and the patient became nauseated and vomited a few times. That night a doctor was called and two hypodermics were required before the pain was relieved. The pain was without radiation, being confined to the epigastrium. Ever since this spell he has been in bed, but has had no further colics or cramps. He was very sore all over his abdomen for two or three days after the attack, but this soreness gradually settled, and now has become limited to the right upper abdominal quadrant. There was no disturbance whatever on urination. He has had diarrhea, five stools per day for last four days.

Patient had never had any prolonged or serious illness except a very mild attack of epigastric pain four months ago, which was similar to the onset of his present trouble in many ways. He was in perfect health at the time he was taken. He had never been married.

He is well developed and fairly well nourished. Color somewhat pale and expression shows that he has suffered considerable pain. Abdomen symmetric and moderately soft. There is some rigidity and tenderness limited to the right upper quadrant and epigastrium. Lower border of liver cannot be made out. There is a small indefinite tender mass in the upper right quadrant, dull on light percussion, and does not move on respiration. Spleen and kidneys not made out.

Chest: Heart normal in outline. First sound soft and prolonged. No murmurs. Heart action regular. Right lung does not expand as well as the left. Litten's phenomenon absent over

right lower anterior chest. Tissues seem thicker and there is some increase in tension in the right lower intercostal spaces. Liver dulness extends to fourth interspace in front and the eighth interspace behind. Vocal and tactile fremitus diminished over the right lower lung anteriorly and posteriorly, with diminished breath sounds. No râles heard. Left chest negative.

x-Ray report: There is slight bulging in the middle of the right chest. Trachea, heart, and aorta negative. Left lung clear throughout. Right diaphragm is fixed upward about 1½ inches, and above this there is a fluid level of a small amount of fluid. Above this there is a shadow of varying density somewhat stringy which goes upward about 1 inch, thus obliterating the lower half of the lung, probably pleuritis.

On admission to the hospital patient had a temperature of 101° F., and a pulse-rate of 84, and for the last five days it has fluctuated between 103° and 99° F. Pulse-rate never went above 105. Respiration varied between 20 and 30.

Urinalysis normal. W. B. C. on admission, 9600. Three days later, 16,600.

Differential count per cent.: Polys., 79; large mononuclears, 7; small mononuclears, 14.

Diagnosis: Subdiaphragmatic abscess.

Operation: I have aspirated the pleura behind in three places without results. I also tapped him in front between the eighth and ninth ribs in the nipple line, and got pus that showed streptococci on smear and culture. I now demonstrate pus again and will resect a portion of the tenth rib in the anterior axillary line. We have evacuated about 14 ounces of thick, yellowish pus. I can feel the diaphragm above and the upper surface of the liver below. This doubtless came from a suppurative cholecystitis.

I recently had the misfortune to have 2 fatal cases of subdiaphragmatic abscess at Vanderbilt Hospital. One died from toxemia two months after a cholecystectomy, with early leaking of bile from the cystic duct stump, giving her an active, acute, local peritonitis with some jaundice from bile absorption. She ran for several weeks a septic temperature and looked ill and

vomited often. I believed it to be a subphrenic abscess and undertook to explore it through the upper part of the original incision. Instead, I evacuated a quantity of foul biliary fluid from the drainage tract itself. I rather thought this was the explanation of her trouble, and proceeded no further. The edge of the liver was adherent to the abdominal wall, and if I had only persevered and gone far enough up in there I would have evacu-

Fig. 468.—Subdiaphragmatic abscess on the right side.

ated the abscess and probably saved the patient. Her symptoms continued, and at the end of another week my diagnosis of subphrenic abscess was confirmed by a splendid *x*-ray (Fig. 468). I evacuated a pint and a half of malodorous fluid in the ninth interspace in the midaxillary line, which gave her a slight respite, but she continued to decline, and died with evidences of toxemia manifested particularly as a nephritis. This sad case could have been prevented if our cystic duct had not given

away. It should have been diagnosed and operated upon earlier.

The other case was in a negro man with a fifth day appendical abscess only partially localized, who was operated upon and drained. He developed acute pulmonary symptoms and had a left-sided pneumonia on the third or fourth day, with some involvement of the right side. He was desperately sick for a number of days, all of which we attributed to his pneumonia, but, that subsiding, left him with a temperature after his pulmonary physical signs abated. His blood count was high. However, there was no abdominal distention, tenderness, or residual abscess. An *x*-ray picture showed a very considerable apparent displacement upward of the diaphragm on the left and led the radiologist to the diagnosis of subphrenic abscess on the left side, to which one of my consultants agreed.

Meanwhile, the house surgeon aspirated the man on the left side between the eighth and ninth interspace and got 1600 c.c. of pus. The patient failing to improve on the third day, we aspirated him again in the same place, and got 200 c.c. of fluid.

The next day we made an incision into the pleura, where we found about the same quantity of bloody, purulent fluid, which was evacuated under local anesthesia through a thoracotomy wound, without avail, as the patient died the same day.

A postmortem showed that the aspirating needle originally employed by the house surgeon had gone into the subphrenic abscess through the pleura and through the diaphragm. Using the same place where the pus was found, I made apparently the same excursion with my needle, but when I came to open the pleura, for which I thought I was operating, and found the pus, I was not conscious that I was not dealing with a left-sided suppurative pleurisy until the postmortem revealed the subphrenic abscess. Not only was there a left-sided subphrenic abscess, the one we had aspirated, but also a subhepatic abscess on the right side. The latter originated from his septic appendical process and had gravitated downward lateral to the colon into the pelvis. By extension across the midline upward and to the left it produced

an abscess under the left dome of the diaphragm. While the recognition of the left-sided subphrenic abscess would not have cured the patient, it shows that a blind needle is not as reliable a diagnostic agent as an *x*-ray and a good physical examination.

The first clinical diagnosis of subphrenic abscess was made by Barlow in the year 1845. Before this time the only knowledge of this disease was that gained from autopsies. It was not until 1890 that any description of surgical treatment appeared in the literature. Subphrenic abscess for all practical purposes may be described as any pus cavity which has the inferior surface of the diaphragm as one of its walls. The under surface of the diaphragm covers a comparatively large area which is subdivided by a number of anatomic structures into several compartments. The falciform ligament acts as a median barrier, thus dividing the space as a whole into a right and left half. The right and left lateral ligaments next subdivides these two chambers into an anterior and a posterior compartment. This results in four intraperitoneal pouches. There is an extraperitoneal area on the right side which lies between the folds of the coronary ligament. On the left side a similar space exists about the upper pole of the left kidney. Altogether then there are six compartments, two of which are extraperitoneal, that have been described by Ullman and Levy.

In any one or more of these spaces pus may accumulate. It does so, however, in the great majority of instances as a complication of some other lesion or as a result of an upper abdominal operation. Its incidence recently has been on the decline, which, I think, can be attributed to the advances made in the diagnosis and early treatment of those abdominal diseases which if left alone produce subphrenic abscess. Fagge in 1909 believed that 50 per cent. of these cases were due to appendicitis. In 1921 he concluded that 80 per cent. were the result of gastric or duodenal ulcer. In other words, prompt diagnosis and early operation, possibly the use of Fowler's position as well, has rendered appendicitis more inert as an etiologic factor. Similar advances in all the fields of medicine are gradually lessening the occurrence of this complication.

Infection may be borne to the subdiaphragmatic space by direct extension, such as would occur in an acute or subacute perforation of a hollow viscus, *e. g.*, the stomach, duodenum, appendix, or gall-bladder. This is facilitated by the suction of the diaphragm and by the fact that any extravasated material will follow the path of least resistance. The kidneys and the lumbar muscles form a wall or a barrier which lies as a ridge between two valleys—the pouch of Douglas and the subphrenic space. This is especially true when the patient is lying in the supine position. Localized areas of peritonitis in cases of chronic perforation of the viscera, according to Moynihan, is important in limiting the infection to a subphrenic abscess. The adhesive powers of the peritoneum and omentum undoubtedly play an important rôle in this manner. Appendicitis of the retrocecal type by direct extension along the open planes of the peritoneum lateral to the ascending colon may produce an abscess beneath the diaphragm. Extraperitoneal infections sometimes extend through the tissues as a cellulitis and eventually infect the subphrenic space, resulting in an extraperitoneal abscess. Infection by the lymph and blood channels must not be overlooked. It is sometimes seen as a part of a general peritonitis.

The diagnosis of subphrenic abscess at times is difficult. The history is of the utmost importance. Repeated attacks of gall-stone colic or the symptoms of chronic gastric ulcer may give some idea as to its point of origin. A patient having had an appendectomy or some recent upper abdominal operation and who does not get well, but continues to run a septic course, should remind one of subdiaphragmatic abscess. Its onset may be acute or it may slowly and gradually develop in a very insidious manner. The patient is toxic and has a "septic complexion." Lockwood calls attention to the temperature chart, which is steeple-like. Leukocytosis is present and may be high. Chills and sweats are not infrequent.

The disease is rarely bilateral and tenderness along the costal margin is the rule. Upper abdominal soreness and pain which goes to the back and possibly to one or other shoulder may suggest cholecystitis. If the abscess is large there is bulg-

ing of the hypochondriac region either before, laterally, or behind. At first the intercostal spaces are sometimes retracted. Later the whole lower chest may bulge to some extent. Deep pain on palpation is the rule. Dulness extends upward beyond the line of liver dulness and often times obscures it. The expansion of the chest on the side of the abscess is limited. The diaphragm is elevated, possibly an inch or more, and fixed. The lung is compressed.

Occasionally these abscesses may contain gas either from a fistulous opening into the intestine, from a communication with a bronchus, or from the growth of certain types of bacteria. Tympany instead of dulness may lead to a misinterpretation of the facts.

A pleurisy or an empyema is sometimes associated with an abscess beneath the diaphragm as shown by the *x*-ray in this case. It was so slight as not to be detected by the needle. Depending on its location the symptoms may be either thoracic or abdominal. An upper abdominal tumor is sometimes difficult or impossible to distinguish between a collection of pus below and one above the diaphragm.

The *x*-ray is a valuable agent in diagnosticating these lesions. It will demonstrate the level of the diaphragm, whether or not it is fixed in position, as well as elevated, the amount of pleurisy, empyema, or lung involvement. In this way it is a great aid in determining the position of the process with reference to the diaphragm. Occasionally these abscesses may contain air, and in such cases it may be beautifully demonstrated in the roentgenogram. Fluoroscopic examinations are important, but in many instances the patient is too ill for the employment of this method.

I wish to lay stress upon aspiration as a means of diagnosis. In a large proportion of cases we are forced to use it as a last resort. A needle of large size should be selected so as not to become easily plugged by thickened pus, etc. Beginning in the back in the scapular line between the tenth and eleventh ribs the needle should be inserted under local anesthesia to the depth of 3 inches. If no pus is obtained the

same procedure should be carried out in the next interspace above, and so on until pus is found or until the sixth interspace is reached. According to Fagge, if all attempts are of no avail, the procedure should be repeated in the midaxillary line, and if this be fruitless the nipple line in front may be selected for a last effort. Owing to the anatomic distortion it is not always possible to know whether the needle has penetrated the lung or the diaphragm and liver, as in one of my cases already spoken of. Writers have called attention to the fact that bright, frothy blood when obtained indicates the needle has pierced the lung, whereas dark blood may be either from the liver or the lung which has been compressed for some time. Another point of some importance mentioned by different writers in the literature on the subject is whether or not the uncovered portion of the needle is stationary or moves with respiration. In the latter case one can feel sure that the needle has penetrated the diaphragm.

When definite confirmation is to be had that pus lies beneath the diaphragm the case then becomes surgical. If left alone, 85 to 100 per cent. die. The question arises which is the best point to drain from. In certain cases there are present physical signs which indicate the point at which the incision should be made, not always. In other instances a great deal depends on aspiration. When pus has been obtained by aspiration through a given interspace, if one has started from below and worked upward this may be taken for the lowest point at which pus can be found. Consequently, the resection of $1\frac{1}{2}$ or 2 inches of the rib which forms the inferior boundary of this interspace will offer the most dependent drainage. The posterior transpleural operation is considered by many to be the best method of approach. This route, however, is not always practical, and no rule which is at all binding can be laid down.

A great many of these patients can be saved by proper and timely surgical treatment. In Lockwood's table of postoperative mortality the death-rate varied from 27.3 to 56 per cent. In the Mayo series it is 33.3 per cent.

CLINIC OF DR. J. SHELTON HORSLEY

ST. ELIZABETH'S HOSPITAL, RICHMOND, VA.

DUODENAL ULCER

THE patient, Mr. C. C. B., is a young man, white, single, thirty years of age. He was admitted to St. Elizabeth's Hospital January 17, 1922. His chief complaint is pain in the pit of the stomach. The stomach symptoms began about six years ago, dull aching in character, and would appear either just before meals or about two hours after meals. They are relieved by taking food. About six years ago an appendectomy was done elsewhere, and he seemed to be somewhat better for a while after this operation, but the pain was not entirely relieved. His most disagreeable symptoms come on after breakfast, and he occasionally vomits. Routine general examination and laboratory examination disclose no further abnormalities. The phenolsulphonephthalein test shows an elimination of 59 per cent. in two hours. Blood Wassermann is negative. Examination of the feces shows nothing unusual; there is no evidence of red blood-cells, and the benzidin test is negative. Roentgen-ray examination shows a J-shaped stomach, which reaches just above the iliac crest in the standing position. The pylorus is normal. The stomach empties in six hours. There is a constant filling defect in the duodenal cap, observed under the fluoroscope. This seems to be an ulcer of the duodenum (Fig. 469).

A long incision is made from just below the ensiform cartilage downward and slightly outward, along the inner portion of the right rectus muscle, to about ½ inch below the level of the navel. There is no free fluid in the peritoneal cavity. There are a few adhesions to the old site of the operation for appendicitis, but the adhesions appear to be only from the omentum.

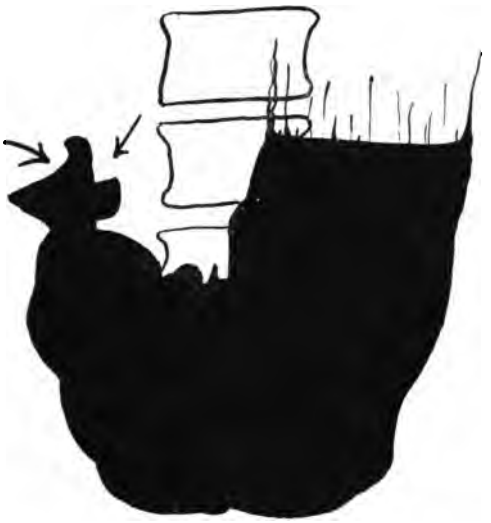

Fig. 469.—Drawing from the x-ray plate of patient C. C. B., showing a filling defect in the duodenum, which was constant.

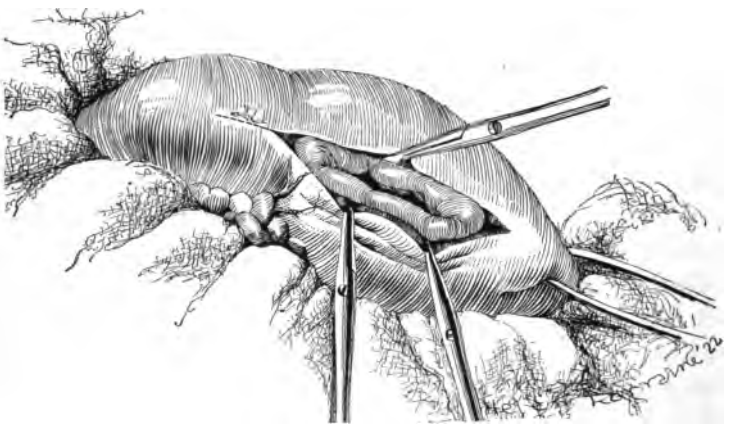

Fig. 470.—The incision is outlined, and the stomach portion of the incision has been completed. The ratio should always be at least 2 parts of the incision in the stomach to 1 part in the duodenum. The incision should never go farther than 1 inch in the duodenum, but may be carried 2½ to 3 inches in the stomach from the pylorus. This causes the angles of the wound when sutured to be in the healthy stomach wall. If the duodenal ulcer is situated farther than 1 inch from the pylorus, this pyloroplasty should not be used.

The gall-bladder seems normal and is not adherent. The stomach is normal, but there is a marked ulcer in the duodenum about ½ inch from the margin of the pylorus. After packing around the stomach, a point on it is selected and clamped about 2½

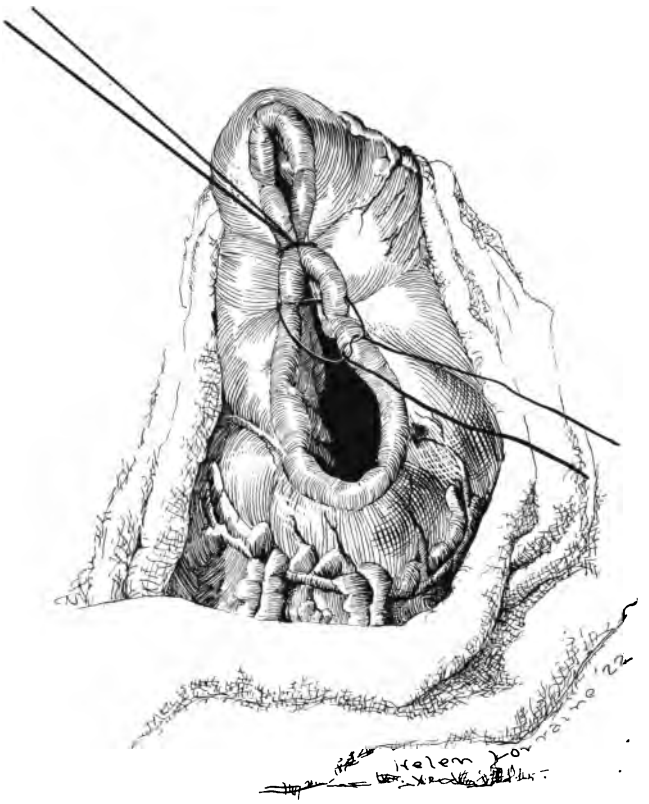

Fig. 471.—Two tractor sutures have been placed, both of tanned catgut. The first extends from the extremity of the incision in the stomach to the extremity of the incision in the duodenum, and the second is about ½ inch above the first suture. They are both made taut, and are tied gently, barely approximating the tissues.

inches from the pylorus, and an incision is made into the stomach from near this point to the pylorus (Fig. 470). A strip of moist gauze is inserted into the stomach to keep back the gastric juice. Sometimes we use a suction apparatus for this. The

pylorus is divided and the ulcer is exposed. There is a crater about $\frac{1}{4}$ inch in diameter on the anterior surface of the duodenal mucosa, nearer the lower border than the upper border, and about $\frac{1}{2}$ inch from the pylorus. The crater is much smaller

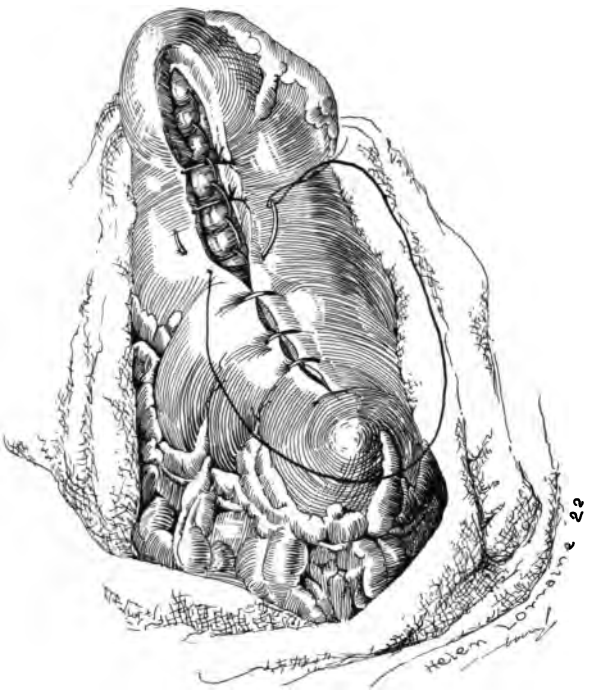

Fig. 472.—The first row of sutures, consisting of a continuous lockstitch of No. 1 tanned catgut, has been placed. The tractor sutures have been cut, and the second row of sutures, also of No. 1 tanned catgut, is being inserted. This row merely approximates the cut edges of the peritoneal and muscular coats. There is no attempt at infolding. When the duodenal wall is reached the first row of sutures has to include the whole thickness of the duodenal coat, and not solely the duodenal mucosa.

than the external scar of the ulcer. The tissues around it are rather thick and firm, but there is no other ulceration. The ulcer is excised. There is no constriction of the lumen at the site of the ulcer. A suture of tanned catgut is placed from the extremity of the incision in the stomach to the extremity in

the duodenum. Another suture is placed just above this and the two sutures are tied (Fig. 471). The mucosa is united with a continuous lockstitch of No. 1 tanned catgut, beginning at the lower angle of the wound. A second row of tanned catgut approximates the cut margins of the muscular coat of the

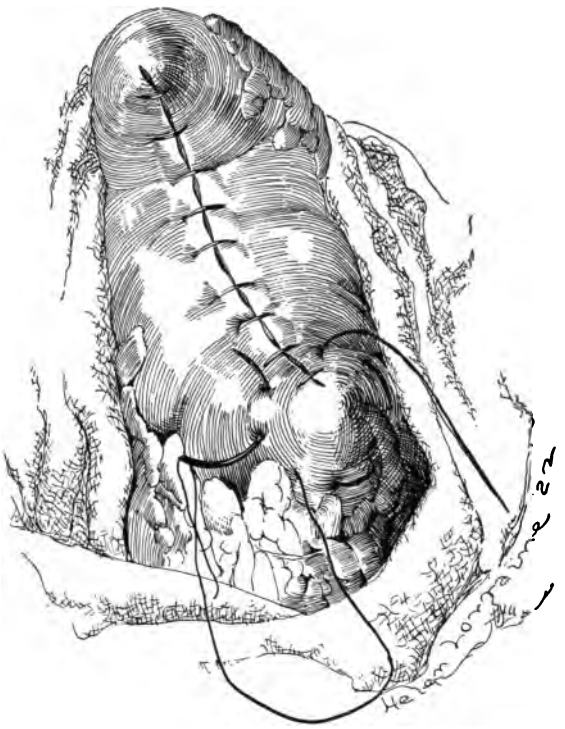

Fig. 473.—The third row of sutures, consisting of No. 00 tanned catgut, is being inserted. This begins at the lower angle, where there is a decided teat-like projection, and is inserted as a purse-string suture. Just before tying this purse-string suture the teat is inverted.

stomach and duodenum (Fig. 472), and then a third row is inserted. This third row is of 00 tanned catgut, and begins as a purse-string suture by turning in the teat at the lower extremity of the wound, and is continued as a right-angle continuous suture, taking a backstitch every few stitches (Fig. 473). The teat at the upper angle is also turned in (Fig. 474).

An interrupted suture is placed about the middle of the sutured wound, and a tag of gastrocolic omentum is brought up and fastened by this stitch (Fig. 475). A small tag of fat from the upper border hangs down, and is fastened by a suture to this gastrocolic omentum. Two other sutures are placed, one to

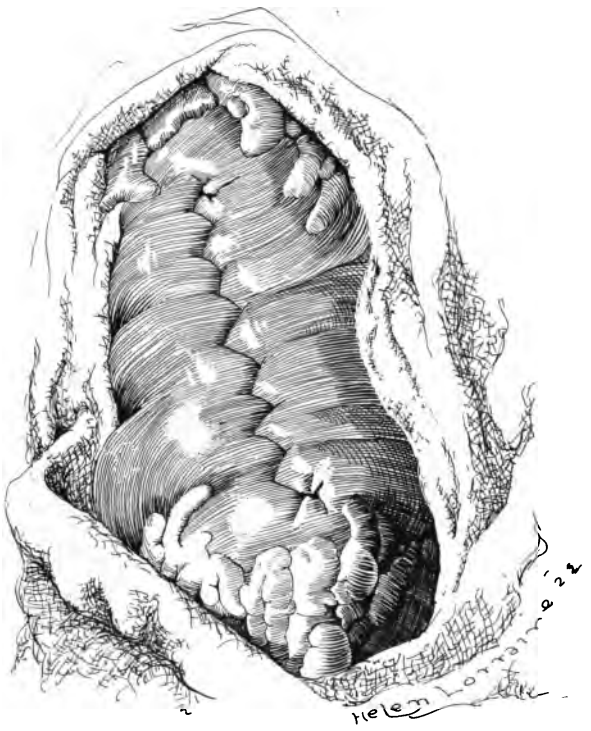

Fig. 474.—This third row of sutures is continued as a right-angle continuous suture, with an occasional backstitch. It buries the other two rows of sutures, and infolds a sufficient amount of the peritoneum. At the upper angle the upper teat is buried just as the lower one was.

the duodenum and one to the stomach, to hold this omentum in position. The gall-bladder appears normal and is not disturbed. The abdominal wound is closed with interrupted sutures of coarse silkworm-gut. The skin is further approximated with fine tanned catgut.

Gastric lavage is given three or four times a day for the first two days. This is not always necessary, but it prevents

Fig. 475.—A tag of gastrocolic omentum is brought up over the line of sutures and fastened with a single suture of No. 00 tanned catgut. This suture is frequently placed and tied across the upper portion of the wound, and then before cutting the ends short the tag of omentum is transfixed with the suture, and the suture is again tied. An additional suture in the stomach and in the duodenum fastens this tag of omentum in position. Sometimes a tag of gastrohepatic omentum hangs down, and may also be included. The object of fastening this gastrocolic omentum in position is to strengthen the line of sutures, to prevent adhesions to the line of sutures, and to exercise a gentle traction to prevent the pyloroplasty incision, after it heals, being drawn up too high under the liver.

distention of the stomach and gives it rest. The stomach does not empty as well immediately after a pyloroplasty as after a

gastro-enterostomy, but this difference disappears as convalescence proceeds. To prevent adhesions the patient is kept on his left side as much as possible, especially during the first week.

Note.—This patient made an uneventful recovery. The wound healed primarily. He was discharged from the hospital February 12, 1922. He has reported several times since then, and he seems to be entirely well and symptom free.

Discussion.—Duodenal ulcer is not uncommon, and has been treated by a variety of measures. In the early stages, when the ulcer has existed only a short time, and when there is no complication that threatens life, such as perforation or bleeding, medical treatment is undoubtedly indicated. The old peptic ulcer, however, which has become callous, may be relieved by medical treatment, but is not usually cured. It would be just as sensible to treat an old ulcer of the leg by rest and elevation for many months, when the same result may be obtained in a few days by the proper surgical procedure, as to treat an old callous ulcer solely by diet and alkali.

There is no one operation that should be employed for every duodenal ulcer. The operation should be made to fit the ulcer, not the ulcer the operation. There are three operations that may be satisfactorily used in different types of duodenal ulcer: (1) pyloroplasty, (2) gastro-enterostomy, (3) simple excision of the ulcer.

Pyloroplasty.—When the ulcer is in the first inch of the duodenum, which is its usual location, and when it is small or of medium size and there is no extensive inflammatory infiltration, a pyloroplasty is indicated. If adhesions are numerous, and particularly if they exist between the duodenum and other tissues than the gall-bladder, pyloroplasty does not give satisfactory late results. When the adhesions are solely or chiefly between the gall-bladder and the duodenum, the gall-bladder may be removed with as little trauma as possible at the time the pyloroplasty is done, and the late results will be excellent. In such cases the raw surface left by the cholecystectomy and the stump of the cystic duct should be covered with omentum held in position by the ends of the ligature on the cystic duct.

In acute perforation of a duodenal ulcer pyloroplasty seems indicated, though adhesions from the irritation of surrounding tissue by the escape of duodenal contents may eventually produce symptoms. A narrow stenosis unaccompanied by adhesions is satisfactorily treated by pyloroplasty. In borderline cases it is better to do a pyloroplasty, for if a secondary operation must be performed, it is much simpler to do a gastro-enterostomy after a previous pyloroplasty than it is to uncouple the gastro-enterostomy, to suture the wound in the stomach and the wound in the jejunum, and then do a pyloroplasty in addition.

Gastro-enterostomy.—Unless otherwise specified, gastro-enterostomy means posterior gastro-jejunostomy by the modern no-loop method. This operation has been often used as a routine surgical treatment for duodenal ulcer. While it has a distinct and a rather wide field, its employment in the treatment of every duodenal ulcer will be frequently followed by unsatisfactory late results. As Dr. Finney has said, gastro-enterostomy, like an amputation, is a confession of failure. It means that the tissues have been so damaged by disease that the restoration of normal physiologic function is impossible, and the next best substitute must be provided. With an open pylorus and no adhesions, late symptoms after gastro-enterostomy are frequent. This seems to be due to the emptying of the acid contents of the stomach directly into the jejunum, which is accustomed only to alkaline contents. This sooner or later causes a reaction in the mucosa of the jejunum, just as a constantly alkaline urine would eventually produce irritation in the urinary bladder. Statistics show that about 3 or 4 per cent. of all gastro-enterostomies are followed by jejunal ulcer, and that jejunal ulcer occurs even when absorbable sutures had been used in the gastro-enterostomy. When we consider that in many of these cases the pylorus was not open, but was obstructed by stenosis or adhesions, the percentage of jejunal ulcers that follow a gastro-enterostomy with an open pylorus would, of course, be much higher. Then it is improbable that every constant irritation of the jejunum results in an ulcer. Doubtless many of these irritations that cause symptoms do

not ulcerate, just as in many cases of irritation of the urinary bladder marked symptoms occur without an ulcer being present. When all these things are considered it will be appreciated that the percentage of lesions in the jejunum following gastro-enterostomy with an open pylorus must be quite high. That there are some patients whose jejunal mucosa has sufficient resistance to withstand the acid contents of the stomach is undoubtedly true; but this should not argue for the correctness of an unphysiologic procedure. There may be an occasional individual whose skin can withstand the action of the gastric juice without marked irritation.

It seems to be the universal surgical experience that a properly performed gastro-enterostomy in the presence of extensive stenosis of the pylorus or duodenum gives satisfactory late results. Here the stenosis prevents the gastric juice from passing through the pylorus and diminishing the alkalinity of the duodenal contents which are delivered at the stoma of the gastro-enterostomy with unreduced alkalinity and so readily neutralize the acid from the stomach. If, however, the pylorus is open, the acid gastric juice passing through the pylorus lowers the alkalinity of the duodenal content, so that it cannot protect the jejunal mucosa from the effects of the acid. When there is marked stenosis the tissues are so permanently damaged that physiologic restoration is impossible, and for reasons just mentioned gastro-enterostomy is the proper operation. When there is a large ulcer that cannot be readily excised or when extensive inflammatory infiltration exists, stenosis will probably result, and, as such tissue does not hold sutures well, a gastro-enterostomy is the proper surgical procedure. When adhesions are limited to the gall-bladder a cholecystectomy together with pyloroplasty as described gives satisfactory results; but if the adhesions are extensive and other tissues than the gall-bladder are involved, or if cholecystectomy has previously been done and adhesions persist, gastro-enterostomy should be performed. When bleeding occurs from an extensive stenosis of the duodenum or pylorus, a simple division of the stenosis, according to the principle of Heinicke-Mickulicz,

and approximation of healthy duodenal and gastric walls to drain away the venous blood should be done. This may be accompanied by a gastro-enterostomy, for contraction after an extensive stenosis may ensue.

Excision of the Ulcer.—If the duodenal ulcer is small, unaccompanied by adhesions or marked inflammatory infiltration, and if situated more than an inch from the pylorus it seems unnecessary to interfere with the stomach or pylorus. In such a case excision of the ulcer by an oval incision, which is sutured transversely to the axis of the bowel, is a simple and satisfactory procedure. This is the practice of E. S. Judd.

The technic of the pyloroplasty by which this patient, Mr. C. C. B., was operated upon was first described in the Journal of the American Medical Association of August 23, 1919. Since then there have been several modifications which have been mentioned in subsequent publications (Ulcer of the Jejunum Following Gastro-enterostomy, Jour. Amer. Med. Assoc., 76, 354–358, February 5, 1921; Ann. Surg., 73, 199–210, February, 1921). One is that two tractor sutures instead of one are now used; and the other modification is that the muscular and peritoneal coats of the stomach and duodenum are merely apposed by the second row of sutures and not infolded. All the infolding is done by the third row of fine tanned catgut (Figs. 471–474). When the tissues are not too badly damaged to permit restoration of normal function this pyloroplasty is exceedingly satisfactory (Operative Surgery, by J. Shelton Horsley, M. D., published by C. V. Mosby Co., 1921).

The first case was operated on by this pyloroplasty April 4, 1918. From that time to the present (May 15, 1922) I have done 43 of these operations. In the first 12 there were 3 deaths. These fatalities have been fully described elsewhere (Ulcer of the Jejunum Following Gastro-enterostomy, Jour. Amer. Med. Assoc., 76, 354–358, February 5, 1921), and were due to bad surgical judgment. I do not believe they would occur now. Since these 3 deaths there has been no operative mortality. Some of the patients on whom this pyloroplasty had been done with good immediate results returned later suffering from the

same symptoms that were present before the operation. A thorough study of these cases by my partner in internal medicine, Dr. Warren T. Vaughan, has shown that there is always some cause for the symptoms. They cannot be dismissed as mere nervousness. They have been due to adhesions, and not to recurrence of the ulcer, except in 1 case, where there was a recurrent ulcer in the upper posterior wall of the duodenum. I did a posterior gastro-enterostomy on this patient May 3, 1922, and he has made a satisfactory convalescence. These patients with recurrence symptoms have been the most instructive cases we have had.

All the patients on whom the pyloroplasty was done, and who had a simple uncomplicated duodenal ulcer, are symptom free. All the patients who had adhesions to the gall-bladder and whose gall-bladder was removed at the time of the pyloroplasty are symptom free. When adhesions to the gall-bladder were merely separated and the gall-bladder was not removed at the time of the pyloroplasty, the late results were unsatisfactory in two-thirds of these patients, and no patient is symptom free. When the gall-bladder was removed from some patients of this latter group at a subsequent operation the adhesions were very extensive and results were satisfactory in only about half of these cases. Here gastro-enterostomy eliminates the symptoms, and was done in one of these patients as the third operative procedure, with apparently complete relief.

One of the greatest therapeutic resources in surgery is rest. After operation on the stomach the rest of the stomach cannot be absolute, but its work can be greatly lessened by giving only the necessary amount of nourishment, and administering it in such a manner and at such times as will impose the least exertion on the stomach. My partner, Dr. Vaughan, has charge of the medical features in the postoperative treatment of the cases of duodenal ulcer, and he will discuss this very important factor.

DISCUSSION OF THE MEDICAL FEATURES OF POSTOPERATIVE TREATMENT

By Warren T. Vaughan, M. D.

Early ulcers with slight or entirely absent Roentgen findings are usually successfully treated by medical means alone, and in such cases we follow as closely as practicable the treatment outlined by Sippy, modifying it only as much as is necessary for a minimum of interference with the patient's occupation. The satisfactory end-results are sufficient proof of the rationale of this method.

The postoperative dietary treatment of surgical ulcers really begins before the operation. An important item is the preliminary determination of free and combined acid in the gastric contents, to serve as a guide in the early postoperative care and for comparison with subsequent determinations. Preoperative treatment in and of itself is often of great importance. If the patient is emaciated, it is well to keep him on a Sippy diet for a week or two, or longer if necessary. The usual temporary subjective improvement under this preliminary treatment sometimes renders it difficult to convince the patient that operation is nevertheless advisable. Nourishment should be kept up until the evening before operation, and water should be allowed to within a few hours of anesthetization.

The first postoperative indication is rest for the stomach. If the nourishment has been properly sustained during the preceding days there is no hardship in two or three days of virtual starvation. Following operations on the stomach that organ is prone to dilate, and gastric lavage is often necessary as a preventive measure. I cannot overemphasize the value of lavage, and the importance of performing it before dilatation and retention have developed.

The patient may have small amounts of either hot or cold water during the first two days, and on the third day fruit juices with 20 per cent. lactose. Hunger and thirst are both easily allayed by fruit tablets, lemon drops or lime drops, which also furnish some slight carbohydrate nourishment. We keep

a supply of fruit tablets constantly in the hospital, and use them as we would any other medication. As a rule, after the third or fourth day the tendency to dilatation has passed, and the tissues have recovered sufficiently so that nourishment in small quantities may be given.

Occasionally we have given a modification of the Sippy schedule, with hourly nourishment and alkali after each feeding, the amount being gradually increased, until at the end of ten days the patient is receiving normal quantities. The feedings are then gradually merged into three meals a day or, rather, into three small meals with some simple nourishment in the middle of the morning and in the middle of the afternoon.

More frequently we start the patient out on two-hourly feedings of 100 ml. amounts, of bland liquids or near liquids, such as strained oatmeal gruel, etc. The feedings for a day will consist, for example, of half-glass or half-cup amounts of hot milk, oatmeal gruel, coffee, lemonade, chicken broth, cocoa, buttermilk, and a cream soup.

If the patient retains this diet satisfactorily, the amount of each feeding is doubled at the end of twenty-four hours. In gastric cases this third stage in the diet is continued for three or four days, rather longer than following other operations. This diet contains 2000 calories, represented by 50 to 70 grams of protein, 200 to 240 grams of carbohydrate, and 90 to 115 grams of fat. The next increase is again continued for from two to four days, and consists of similar feedings, at the same intervals, but of more substantial dishes. Thus, the feedings for a day are orangeade, with lactose, poached egg and creamed toast, chicken broth with a cracker, cream soup, oatmeal gruel with milk, poached egg on toast with butter, baked custard, and chocolate malted milk. This again has a value of 2000 calories.

A rather heavier diet, but of the same caloric value, is given around the end of the first week of feeding. Such a daily schedule will contain baked apple, farina or other breakfast food, milk toast, junket, creamed fish, purée, fruit soufflé, broth, stewed fruit, and barley gruel with milk. At the end of

two weeks the patient is taking a full soft diet, with feedings five times a day.

After the first day of nourishment, when the patient is tried out on half quantities, he receives at least 2000 calories daily, which is ample for his needs, and which is sufficient to satisfy the appetite. The caloric value of the soft diet is higher.

As a rule we find it unnecessary to give alkali with or after any of the feedings. Following operation, particularly after pyloroplasty, the acidity of the gastric contents usually decreases to within or below the limits of normal.

In the majority of cases no further dietary treatment has been necessary other than restriction to three small meals a day with additional nourishment in the middle of the morning and in the middle of the afternoon, the usual omission of acid and greasy foods, etc. We have been able, by rational co-ordination of the medical and surgical care of these patients, to escape the necessity of using the virtually incapacitating Sippy diet, incapacitating because of the frequency of the feedings and the long duration of the régime.

ADENOCARCINOMA OF THE KIDNEY

THE patient, Mrs. F. M. D., thirty-three years of age, white, has been married two years. Her chief complaint is pain and "a lump" in the left side of the abdomen. She was admitted to St. Elizabeth's Hospital January 4, 1922. The menstruation had been regular to October, 1921, since which date there has been none. The uterus is enlarged to the size of about a three months' pregnancy. Pain began in April, 1921, as a general bodily pain, and the patient felt that she had some fever. Later there were attacks of severe pain in the left side of the abdomen. A lump appeared in the left upper portion of the abdomen with these attacks of pain. She would remain in bed for two or three days, and the lump would apparently disappear with the pain. She had had several similar attacks to last August, since which time the lump has remained and seems to be growing larger. She now has only occasional pain of moderate severity. She has not had hypodermics for the relief of pain.

The Wassermann is negative. Urologic examination by my partner in urology, Dr. A. I. Dodson, is as follows:

"A catheterized specimen of the urine contained a large number of clumped leukocytes, red blood-cells, and albumin; 55 per cent. of phenolsulphonephthalein was eliminated in two hours.

"Cystoscopy under novocain anesthesia showed the bladder capacity to be normal, and the mucosa normal with the exception of slight congestion in the region of the left ureteral orifice. The right orifice was normal in appearance, contracted normally, and a clear stream of urine was seen coming from it. The left orifice was edematous, slightly gaping, and contracted sluggishly. Urine from the left orifice was cloudy; 2 c.c. of indigocarmin were given intravenously, and appeared from the right orifice in four minutes, and from the left orifice in ten minutes.

A No. 6 catheter was passed up the left ureter 25 cm. without obstruction, and the specimen collected contained leukocytes and red blood-cells. A similar catheter was passed up the right ureter 5 cm., and the specimen collected was entirely negative. The passage of the ureteral catheter, although gently done, is not devoid of discomfort and danger. The ureter may be traumatized, causing bleeding, and infection may be carried up from the bladder. Therefore we only pass the catheter just far enough into the healthy ureter to collect a specimen. In some instances it is not necessary to catheterize the sound side at all.

"The patient was then carried to the *x*-ray room with a leaded catheter in the left ureter. Under the fluoroscope a 25 per cent. solution of sodium bromid was run into the kidney pelvis, which was found to hold 15 c.c. without discomfort. The bromid shadow seen near the upper part of the tumor can be moved by manipulating the tumor. *x*-Ray shows an enlarged but regular pelvis, and the outline of a tumor springing from the lower pole of the kidney.

"Diagnosis: Tumor of the left kidney springing from the lower pole; pyelitis of left kidney."

Operation.—January 7, 1922. An incision is made along the outer portion of the left rectus muscle. I find no free fluid in the peritoneal cavity. The liver is palpated, and several nodules are felt both in the right and in the left lobes. These are probably metastases. There is no evidence of metastasis elsewhere. The uterus is large and soft, and appears to be about two and a half months pregnant. The tumor is retroperitoneal with the sigmoid in front of it. The incision is prolonged upward and downward until it is about 9 inches in length. The posterior peritoneum is incised external to the sigmoid and descending colon, which are brushed toward the midline with dry gauze dissection. There are several large anastomosing veins between the fascia around the growth and the mesosigmoid. The tumor is exceedingly vascular, there being large veins surrounding it in all directions. The vessels are doubly clamped and divided, and the growth is

mobilized so that the upper portion of the kidney is exposed. The pedicle is now dissected out with gauze and clamped with three forceps, but not divided. This is done to prevent dislodgment of tumor cells into the renal vein during further manipulation. The growth is dissected from below and externally, and the anastomosing vessels are doubly clamped and divided. The pedicle is now divided between the external and the middle forceps, and the tumor is removed. The vessels are tied with catgut, and the pedicle is tied with two ligatures of catgut about ½ inch apart, removing the inner forceps first, and placing the first ligature here. A rubber tube and a cigarette drain are placed through a stab-wound in the lumbar region into the space left by removing the tumor and kidney. The drainage comes out along the outer portion of the quadratus muscle. The posterior peritoneum is sutured with plain catgut, closing off the abdominal cavity entirely. The anterior wound is closed with interrupted sutures of coarse silkworm-gut.

The specimen consists of the left kidney, with the tumor at the lower portion. The growth springs from the lower pole of the kidney, and does not communicate with the pelvis. The surface is covered by many dilated veins. The capsule apparently is not broken, except at one small point posteriorly. The specimen is 7 inches long, 4½ inches wide, and 4 inches thick; it weighs 725 grams. On section the tumor is circumscribed and is sharply outlined from the healthy upper portion of the kidney. There is considerable material of a yellowish appearance, which resembles somewhat the color of a hypernephroma. However, the pelvis is not involved and the yellowish material seems to represent some degeneration, and is not the dominant color (Fig. 476). A frozen section shows the tumor to be an adenocarcinoma. The cells seem to be not well differentiated and are moderately malignant. The tumor is an adenocarcinoma.

A celloidin block section shows more clearly the structure of the growth. The cells tend to duplicate portions of the renal tubule. In some areas they are more highly differentiated than in others. The nuclei are irregular (Fig. 477).

Note.—The patient made a satisfactory recovery, and left the hospital on January 31, 1922. At the present time (May, 1922) she is doing well, and the pregnancy appears to be normal. Five days after operation Dr. Fred M. Hodges gave the patient

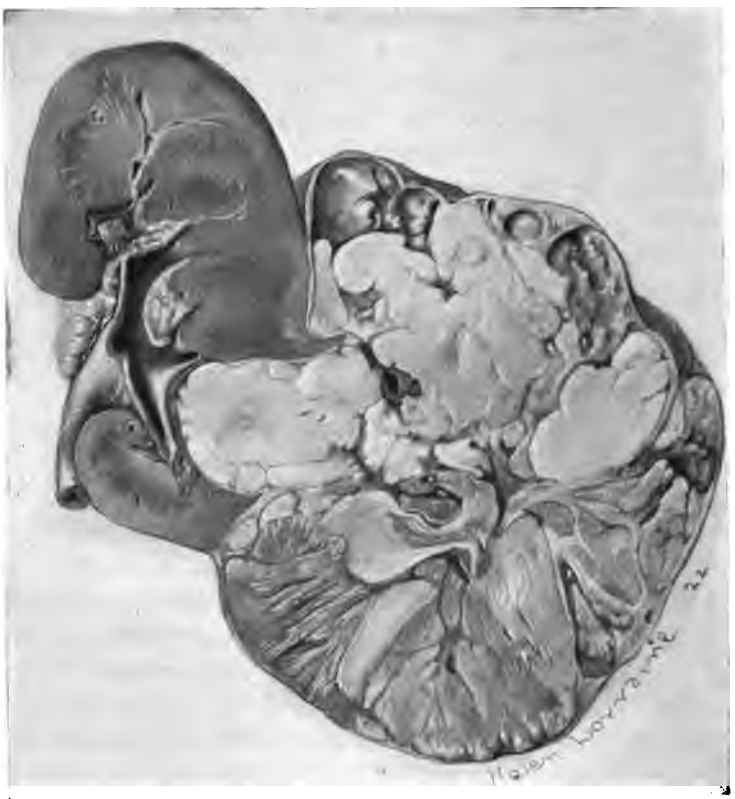

Fig. 476.—Drawing of a section of the adenocarcinoma of the kidney, removed from Mrs. F. M. D. Note the sharp outlines of the tumor, and the fact that it does not invade the pelvis of the kidney. The tissue in the fresh stage was soft, but it hardened in formalin. The growth was very vascular.

a deep Roentgen-ray therapeutic treatment over the region of the liver. This treatment was repeated by Dr. Hodges several times.

Discussion.—There are many interesting features about

this case. First of all, a true adenocarcinoma of the kidney is not a common tumor. Probably the malignant tumors that are most frequently encountered in the kidney are hypernephromas or, better, mesotheliomas, as called by Wilson. Occasionally a papillary malignant growth arises from the

Fig. 477.—Photomicrograph of adenocarcinoma shown in Fig. 476. There is some attempt at reproducing the sections of the tubules of the kidney. The cells are mostly cuboidal. Some areas show a greater differentiation than others. The nuclei are irregular, though there are no distinct mitotic figures. (× 150.)

renal pelvis and involves the kidney. So-called sarcomas in young children are also not uncommonly seen. This patient happens to be the second case of adenocarcinoma of the kidney that we have had within the last two years, and these 2 cases are all that I have ever encountered. In the first patient,

Mrs. S. A. H., operation was done November 29, 1920. She had a growth from the lower portion of a double fused kidney on the right side, there being apparently a well-developed kidney on the left side. There were two ureters, and the upper kidney of these two fused kidneys was only secondarily involved. The gross specimen was similar on section to that of the patient whose operation has just been described. Microscopically the cells were of similar character, but seemed to be somewhat more differentiated. This patient has metastases and is being treated by *x*-ray and radium.

The problem in Mrs. F. M. D. was not only the unusual type of growth, but the fact that she was about two and one-half to three months pregnant, and had metastases in the liver. The right kidney being apparently about normal, it became a question to decide whether, in view of the metastases in the liver, a nephrectomy was justifiable, and also whether the pregnancy should be terminated. Although there were metastases in the liver, they were not large enough seriously to encroach upon the function of the liver, and it seemed wise to preserve the pregnancy so as to save the child, even though it was probable that the mother's life could only be prolonged a few months by the nephrectomy.

In this connection the work of Dr. Maud Slye is exceedingly interesting. Dr. Slye (Journal of Cancer Research, January, 1920, pages 25–52) has given a very illuminating study on the relation of pregnancy to tumor growth as observed in mice. The tumors selected for the study were of the same type and of the same organ. They were alveolar cancer of the mammary gland. This type of tumor in a mouse can be readily observed each day. Dr. Slye found that without exception the amount of tumor grown by a female mouse while reproductive was much less than during her non-reproductive period, and that the amount of tumor in reproducing females was strikingly less than in non-reproducing females. The normal course of these tumors in mice that are not breeding is very rapid. The mouse rarely lives over six weeks, and the tumors grow to a large size. When, however, mice with cancers of the breast

are bred, the tumor hardly grows at all during the period of pregnancy. The duration of the tumor is greatly prolonged, and the mouse frequently lives nearly a year after the appearance of the tumor, during which time she may bear six or eight litters of young. But, if the mouse ceases reproducing, the tumor grows with great rapidity, and to a large size, and the mouse often survives only a few days after the birth of the last litter. During the six or eight days the female mouse is non-reproductive, the tumor grows larger than during the eight months or a year when she is reproductive. It seems, therefore, according to Dr. Slye, that while the mouse is reproducing embryos, she is producing the tumor very slightly, but after the pregnancy is terminated the biologic resources of the mouse concentrate on the multiplication of the tumor-cells.

Cancer and pregnancy, being both growth processes, appear to draw upon the same energy in an animal, and are nourished by the same food. When a female is well advanced in tumor growth before pregnancy occurs the offspring is usually premature.

It seems obvious, then, that if we are to accept the conclusions of Dr. Maud Slye, a malignant growth in a pregnant woman should be extirpated during the pregnancy, not only for the benefit of the fetus, but because the pregnancy has a temporarily inhibiting effect upon the growth of the malignant cells. After delivery this inhibition is terminated, and the growth is much more rapid. Following this analogy, if a pregnant woman develops cancer, operation for extirpation of the cancer should be done during gestation, and the utmost care should be taken to preserve the pregnancy and let it go the full term. For, if the pregnancy is terminated, whatever inhibiting power it may have had on the progress of the cancerous disease is at once lost. The cancer interferes with the development of the fetus, and for this reason also should be extirpated.

OSTEOMA OF THE HARD PALATE

MRS. M. B. P., aged fifty-six, married, 4 children—2 living and well—was admitted to St. Elizabeth's Hospital February 24, 1922. Operation February 25, 1922. The physical examination shows nothing of special interest except a mild nephritis with a small amount of albumin and a few hyaline and granular

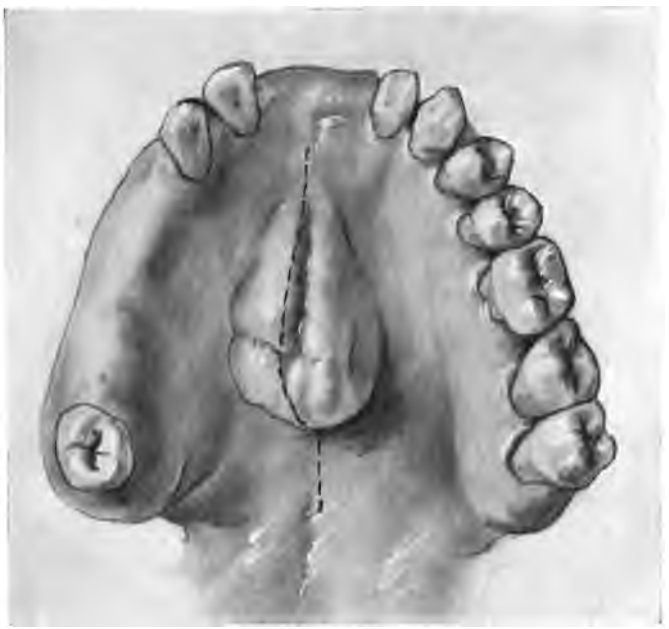

Fig. 478.—Drawing of osteoma in the hard palate of Mrs. M. B. P. The dotted line shows where the incision was made.

casts. Phenolsulphonephthalein test shows 48 per cent. elimination in two hours. The Wassermann is negative.

The chief complaint is a growth in the roof of the mouth. This was first noticed about four weeks ago; it has never been painful. It is not ulcerated. It must, however, have been

present for a considerably longer time than the history indicates. The growth has a bony hardness, and is oblong, sessile, and larger posteriorly than anteriorly. It occupies the midline, and extends from near the posterior margin of the hard palate to within about ½ inch of the alveolar process.

On account of the nephritis and a slight bronchitis the operation is done under local anesthesia. The tissues around

Fig. 479.—The mucoperiosteal flap is being gently stripped up for about ½ inch from the margins of the osteoma.

the osteoma are infiltrated with ½ of 1 per cent. novocain solution, to which have been added 2 drops of adrenalin solution to 1 ounce of novocain solution. An incision with a sharp-pointed knife is made in the midline (Fig. 478). The mucosa and periosteum are carefully stripped up with a periosteal elevator. This layer of tissue is very thin, and must be handled

carefully in order not to injure it. The mucoperiosteal flap is stripped up for about ½ inch from the base of the tumor (Fig. 479). A small sharp chisel is now driven into the palate about ¼ inch from the base of the osteoma. The chisel is pointed inward and upward toward the midline. After making a number of these short perforations with the chisel, the spaces between

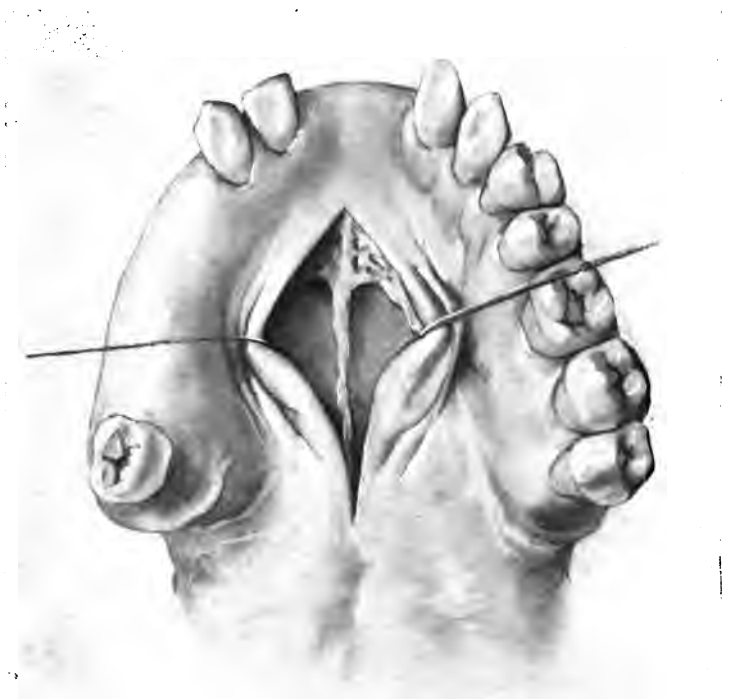

Fig. 480.—The osteoma has been removed by a chisel. The cavity is shown with the median septum of bone. The mucosa of the floor of the nares has not been perforated.

the perforations are divided by driving the chisel horizontally on each side. The separation anteriorly has to be done quite thoroughly, as the hard palate is thicker at this region. After mobilizing the osteoma it is seized with a pair of Ochsner forceps and twisted out. This leaves a cavity which does not communicate with the nose, as the chisel was applied in such a

manner as to push the mucosa of the nose in front of it (Fig. 480). There is very little bleeding. The wound is packed for a few minutes, and this seems to stop the bleeding entirely. Bleeding after an operation under local anesthesia, particularly when adrenalin has been used, is sometimes very deceptive. The pressure of the solution and the action of the adrenalin tend to contract the blood-vessels, and after the solution has

Fig. 481.—The wound has been closed with interrupted sutures of fine silver wire.

been absorbed frequently the vessels will open and secondary hemorrhage occurs. The wound is closed with interrupted sutures of fine silver wire (Fig. 481).

The specimen consists of the osteoma, which is surrounded by a small amount of apparently healthy bone. On the upper surface there is a crest, which is $\frac{1}{4}$ to $\frac{1}{2}$ inch high. Posteriorly the growth ends more abruptly than anteriorly. It is very

hard and firm, and appears to be a typical osteoma. There is no suggestion of malignancy. The osteoma is 1½ inches in length (Fig. 482).

Note.—The patient was returned to bed, and after about two hours there was oozing from the wound. This was temporarily controlled by placing a wad of dry gauze next to the wound and holding it in position with the tongue. The bleeding continued, however, and the anterior sutures were removed and the wound was packed with iodoform gauze. The packing

Fig. 482.—On the left is a view of the specimen showing the under surface. Below is the posterior portion, and above the anterior portion, of the tumor. On the right is a lateral view, showing the crest, which represents part of the vomer.

was removed after two days, and the wound was again sutured with interrupted sutures of silver wire. This brought the wound into fairly good approximation and it healed satisfactorily. When the patient was discharged (March 8, 1922) the wound had almost completely healed.

A very similar growth in Mrs. W. P. was removed in the identical manner as the operation just described. In this wound, however, there was no secondary bleeding, and the wound healed by first intention. Operation February 7, 1922.

Discussion.—These two tumors are so very similar in appear-

ance as to be quite remarkable. They produced no pain and caused very little discomfort. Both tumors seemed to be growing slowly. The mucosa over the osteoma in each patient was exceedingly thin, and might easily have been injured and would have ulcerated. Because of the poor blood-supply to the mucosa it seems probable that ulceration would have been slow in healing.

Tumors of this kind, even though non-malignant, when growing slowly and causing even slight inconvenience, should be removed, particularly if the removal can be done under a local anesthetic in such a manner as to impose as little risk as possible. The blocking of the surrounding tissues, particularly around the soft palate and the regions of the anterior and the posterior palatine foramen, can be easily accomplished, and will render the operation almost painless provided there are about five to ten minutes between the time of infiltration and the operation.

It is exceedingly important in these cases to preserve the mucosa and to strip it up as gently as possible. The wound cannot be protected from infection except by general cleanliness of the mouth, so, as in operations on cleft palate, reliance for good healing must be placed upon handling the tissues gently, and preserving the nutrition of the flaps as carefully as possible.

BASAL-CELL CARCINOMA OF THE SKIN

MR. E. J. F., aged sixty, white, was operated upon by me about two and a half years ago for cancer at the inner canthus of the right eye. This had been previously treated by various methods, including *x*-ray and radium, without success. The growth involved the conjunctiva, and it was necessary to remove the eyeball, the conjunctiva, the adjacent portion of the lids, and the skin over part of the nose. This was done in one mass as a block dissection, and the raw surface was immediately cauterized with the electric cautery. Pathologic examination showed a basal-cell cancer.

The patient has made a satisfactory recovery, and so far has had no local recurrence. He noticed, however, a few weeks ago a small growth on the skin in the left mastoid region about ½ inch behind the ear. This growth is painless, and is covered with a scab-like formation which seems to be desquamated epithelium and coagulated serum. It is oblong in shape, about ½ inch in length. Operation August 22, 1921: The tissues are infiltrated with novocain solution, ½ of 1 per cent., to the ounce of which 3 drops of 1 : 1000 adrenalin solution have been added. In operating on such cases the technic of administering the local anesthesia is highly important. If the needle is thrust into the cancer there is, of course, a great probability of spreading cancer cells into the adjacent tissue. The injection should be made some distance from the growth and into healthy tissue. I begin the injection at a point about 1 inch from the nearest portion of the growth. The infiltration is rather extensive. Similar points are selected around the growth until it is completely surrounded with novocain solution. In this way the fluid is made to flow toward the tumor, and not away from it, so that any cells that may have escaped from the immediate limits of the cancer will not be distributed into fresh tissue, but will be forced back toward the cancerous focus. After

waiting a few minutes for the anesthesia to take effect, the ulcerating growth with a small surrounding area of healthy skin is excised in an oblong incision. This entire operation is done with the electric cautery, and after removal of the cancer the wound is again seared. After this, with a fresh set of instruments, the skin is undermined and the margins of the wound are approximated with interrupted sutures of silkworm-gut. There is no pain to the operation, and the patient is not required to stay in the hospital. The operation lasted ten minutes, and the patient's pulse was 84 throughout.

The specimen consists of a mass of tissue, oblong in shape, and about 1½ inches in its longest diameter. In the center is an oblong growth, covered with a scab and about ½ inch in length. It is raised from the skin, has firm edges, and infiltrates the tissue around it. On section it seems to be surrounded by a considerable margin of apparently healthy tissue. Microscopic examination shows a squamous-cell carcinoma of the basal-cell type. The cells are arranged in columns, and suggest tubules, which are long, and in places fairly regular. There is a resemblance to the tubular form of adenomatous growth. At other points the arrangement is irregular (Fig. 483).

Mr. C. P. B., aged fifty-three, white. Patient's history has no bearing upon his present complaint. He noticed two years ago a little red "pimple" to the outer side of the right eyebrow in the right temporal region. The growth has never been painful. It has gradually enlarged. He attributes its origin to the irritation from that portion of the frame of spectacles which runs back over the ear. The growth now is about ½ inch in diameter.

Operation December 29, 1921: The tissues around the growth are infiltrated in a similar manner to the operation just described, and the tumor is excised with a diamond-shaped portion of apparently healthy skin. In excising these growths it is exceedingly important not to touch the growth with a sponge or an instrument. Such manipulation is likely to scatter the cells and to cause a recurrence by implantation. When excising these suspicious growths there should always be a sur-

rounding margin of healthy skin; $\frac{1}{8}$ inch is sufficient. For cosmetic purposes and to facilitate closing the wound it is usually necessary to make the incision oval or diamond shaped, so that it narrows out at the two ends. After undermining the margins of the wound the skin at one end of the growth can be lifted with forceps and the growth may be manipulated in this way.

If these precautions are taken it is not always necessary to use the cautery. If, however, the growth seems to have

Fig. 483.—Photomicrograph of basal-cell cancer from the mastoid region of Mr. E. J. F. The cells are arranged in columns, and suggest tubules which in certain areas are fairly regular. It has a resemblance to the histologic appearance of the mucosa of the pyloric end of the stomach. (× 150.)

been rapid, it is best either to use the electric cautery for the excision, or, what is equally satisfactory, to excise with a knife and immediately afterward cauterize the whole raw surface. If the wound is large, this latter procedure is quicker and is equally safe. If a large scar follows, there will be a deformity by contraction which will pull out the eyelids at the outer canthus. In order to avoid this I do not use the cautery. I suture

the wound carefully after controlling the bleeding. A continuous subcuticular suture of fine silkworm-gut is placed, and over this an epithelial stitch of arterial silk. The operation lasted fifteen minutes.

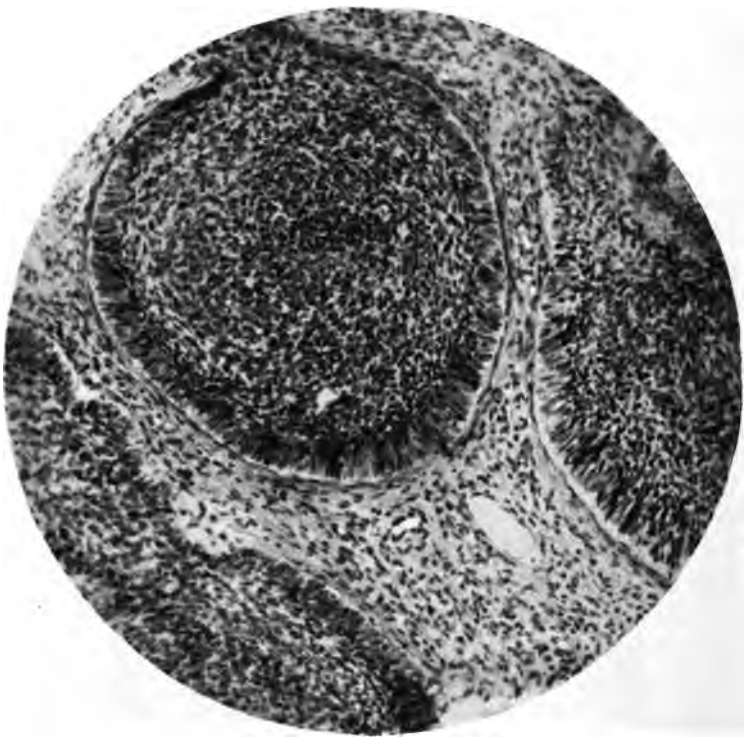

Fig. 484.—Photomicrograph of basal-cell cancer from Mr. C. P. B. There are large masses of epithelial cells surrounded by columnar-like basal epithelium. In certain areas this layer of columnar cells becomes very inconspicuous, and actually disappears, though it is present in most of the slide. There are no "pearls" at any point. (× 150.)

The specimen consists of a diamond-shaped piece of skin about 1 inch in diameter with a papillary growth in the center of the specimen. The papilloma is somewhat pigmented, and is sessile and rather soft. On section the tumor does not infiltrate the entire corium. Celloidin section shows a basal-cell carcinoma. There are large masses of epithelial cells surrounded

by distinct lines of columnar basal epithelium. There are no "pearls." The growth is typical of many basal-cell carcinomas (Fig. 484).

Note.—In the first patient, where the cautery was used freely, the wound broke down and suppurated. The suppurative process was limited, however, and the wound healed within a few weeks with very little discomfort. In the second case the wound healed primarily. Inquiry about these patients (May, 1922) shows that they are both well and free from recurrence.

Discussion.—Basal-cell cancer is of great interest. These 2 cases are reported chiefly in order to show how simple the operation is. In the first case the growth was somewhat more extensive and the diagnosis was more probable than in the second, so it seemed wise to use the cautery. The patient, however, was operated upon practically without pain, and it was not necessary for him to stay in the hospital. In the second case, as the growth was smaller, by carefully avoiding implantation it was unnecessary to use the cautery, and, consequently, good wound healing resulted.

The electric cautery is very helpful in the treatment of basal-cell cancer or any cancer of the skin, particularly after the growth has reached the point of ulceration. If the cancer is of the spinous-cell type, which tends to metastasize, the cautery should always be used, even at the expense of poor cosmetic result and later cicatricial contraction. This can be corrected by an independent plastic operation after the cancer has been cured.

Excision of growths in this manner, painlessly and without residence in the hospital, seems, unfortunately, to be not sufficiently appreciated by the public, and, to some extent, by many members of the medical profession. It is strange that any intelligent patient will submit to the application of a paste, frequently from the hands of a charlatan, will undergo the action of the caustic for hours or days, will endure the resultant sloughing out of the necrosed mass, and the subsequent tedious healing, merely because of a superstitious dread of the knife.

When a patient has had a paste applied for a skin cancer, and is later operated upon for a recurrence, he is surprised at the lack of pain and the greater comfort and efficiency of the operation. In spite of this, however, there are now in the United States thousands of individuals who are following the same track, and subjecting themselves to unnecessary suffering, pain, and discomfort for a far less efficient procedure than an operation.

These 2 patients represent the early stages of basal-cell cancer. Occasionally we see patients who have been treated in various ways unsuccessfully, and in whom the cancer has become very extensive. In extensive basal-cell cancer practically all of the operation should be done with an electric cautery and under a general anesthetic. The growth should be thoroughly cauterized, then excised with the cautery. If bone is involved, a saw is used to remove the necessary amount of bone, and then the raw surface of the bone is cauterized.

The more extensive a basal-cell cancer is, the more difficult it is to cure, and while the simpler, earlier cases are readily cured, the extensive ones are exceedingly difficult, and call forth the best efforts of the surgeon, who should utilize not only his art as an operator, but his knowledge of pathology.

There is one very significant fact about basal-cell carcinoma of the skin, as compared with the spinous-cell carcinoma of the skin, and that is, the basal-cell type does not metastasize, while the spinous cell does. This happens so constantly as to be striking. A. C. Broders, of the Mayo Clinic, has shown that spinous-cell cancer varies in malignancy according to the degree of differentiation of its cells. He has divided this cancer into four grades: "Grade 1" has many "pearls," which represent attempts at cornification. This grade is the least malignant, and does not often metastasize. The other extreme is Grade 4, in which there are no "pearls," and in which metastasis is early and rapid. Even in Grade 1, however, metastasis sometimes occurs.

It is interesting to notice that an extensive basal-cell cancer involves all tissues that are in the way of its progress with

apparently equal effect. In this respect it resembles cancrum oris. But the spinous-cell type of cancer while involving adjacent tissue tends to follow the lymphatics, and to some extent the planes of fascia and soft tissue offering the least resistance.

In marked contrast to the spinous-cell type of cancer is the basal-cell type, which does not metastasize. It seems highly probable that this is due to something in the tissues at a distance from the basal-cell cancer which interposes an insuperable resistance to the cells of the cancer. The cells of the basal-cell cancer are certainly no larger than those of the spinous-cell type. Usually they appear to be smaller. They have access to the same lymphatics that transport the spinous cells. It is reasonable to assume, then, that the cells of the basal-cell cancer are transported to tissues at a distance from the growth, but perish because of some substance that makes their growth in the new locality impossible. Apparently in tissue in the immediate neighborhood of the basal-cell cancer this resistance is weakened or abolished.

The evident conclusion from a consideration of this feature of the pathology of basal-cell cancer is that if tissue from a distance contains some substance which inhibits the growth of a basal-cell cancer, therapeutic advantage should be taken of this fact. Consequently, in the treatment of extensive basal-cell cancer after Roentgen ray, radium, and simple excision have failed, the procedure should be as follows: The cancer should be cauterized and then extirpated with the electric cautery. If the bone is involved a chisel or saw may be used, but the raw tissues left after excision should be thoroughly cauterized. At the same operation a distant flap should be outlined, probably on the neck or chest, if the basal-cell cancer is on the face. Under local anesthesia the flap can be partially dissected at intervals of a few days, so as gradually to throw the nutrition for the flap into the pedicle. As soon as the slough has separated from the burned surface left after excision of the basal-cell cancer the flap should be transplanted to this raw surface. We will thus have not only the advantage of an operation carried out so far as possible with the electric cautery,

which tends to prevent reimplantation in the immediate neighborhood of the cancer, but we will have the additional advantage of the early transference of a flap of tissue which seems to carry substances that inhibit the growth of the cancer. This is not for cosmetic, but for therapeutic, effect.

Fig. 485.—Photomicrograph of basal-cell cancer of Mr. G. K. P. This was a very extensive growth. The basal cells are infiltrating the underlying tissues. On the surface is an area which was cauterized before the operation. (× 155.)

One such case I reported in the Journal of the American Medical Association (February 11, 1922, pages 212–216), where the basal-cell cancer (Fig. 485) had destroyed the upper lip and the anterior portion of the alveolar process with most of the incisor teeth. The patient had had several operations, had had cancer paste applied, had been treated with large

amounts of radium, and many times with the Roentgen ray without a cure. He was given ether in the usual way, and when under the influence of the anesthetic a tracheotomy was done and the anesthetic continued through the tracheotomy tube. The pharynx was packed off with moist gauze, and the surface of the cancer was thoroughly cauterized with the Percy cautery. The growth was then removed with a sharp electric cautery and a saw, and the raw surface was again cauterized. A flap from the chest was outlined, with the pedicle in the neck just beneath the jaw. The tracheotomy wound was closed. At intervals of a few days the flap was gradually freed under local anesthesia, so developing the blood-supply from its base. After the slough had fully separated, the flap, which had been Thiersch grafted on the raw surface, was partially denuded so that the raw surface on the flap would appose the raw surface on the face, and was sutured to the wound on the face. After a few weeks the pedicle was severed. This operation was done on May 6, 1920, and at present there is no sign of recurrence, though this growth had been increasing, notwithstanding numerous operations and treatments, for nearly fifteen years.

In another somewhat similar case the same principle was attempted. The growth (Fig. 486) involved the antrum, and it seemed impossible to apply the raw surface of the graft accurately to all of the raw surface left by excision of the basal-cell cancer. There was no recurrence where the raw surface of the flap united to the raw surface left by excision of the cancer. However, where the skin surface of the flap was in contact with the wound recurrence occurred. This case, with several recurrences, seems even more valuable in demonstrating the principle of the inhibitive effect of tissue from a distance on basal-cell cancer than the patient who appears to be entirely cured.

The marked irregularity of the histologic structure of basal-cell cancer is very noticeable. In the accompanying photomicrographs (Figs. 483–486) four different types are shown. One is from the patient who had extensive basal-cell cancer and seems cured (Fig. 485). In another there is a type in which

the cells are infiltrating, some more deeply, and in certain areas they are found as an adenomatous-like structure (Fig. 486). In a third type there is, as a rule, a definite arrangement of columnar cells at the margins (Fig. 484), with a simpler basal

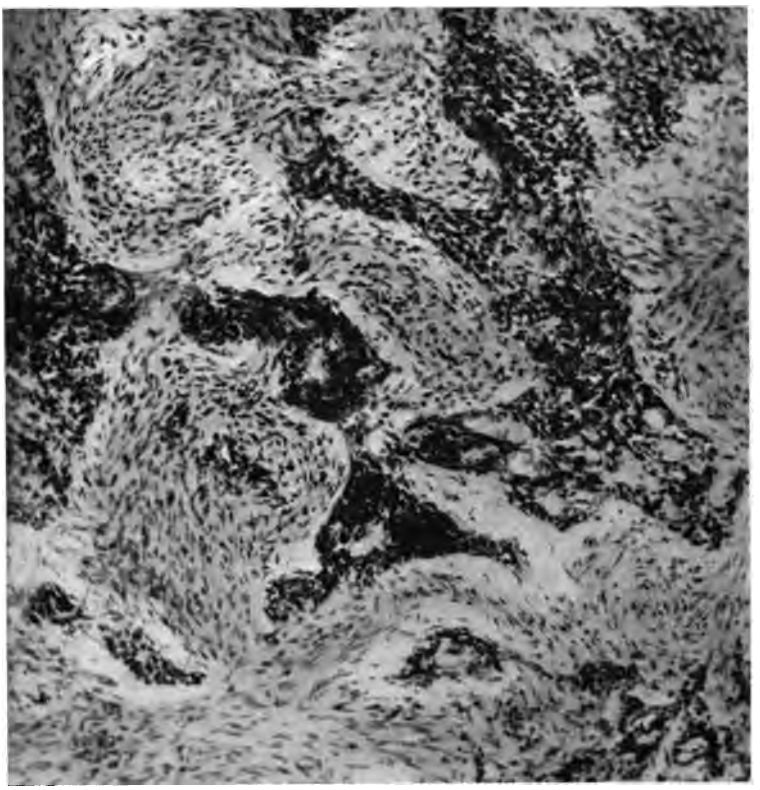

Fig. 486.—Photomicrograph of an extensive basal-cell cancer which involved the antrum, upper lip, and a portion of the alveolar process and hard palate. This area is from the mucous membrane. The basal cells penetrated not more than ¼ inch from the edge of the ulcerated area. There is a tendency toward adenomatous-like arrangement in certain areas. (× 155.)

cell within the growth. This resembles slightly some adamantine epitheliomas. A fourth type presents adenomatous structure somewhat resembling the histology of the pyloric portion of the gastric mucosa (Fig. 483). The cells of these cancers vary

greatly in arrangement and in shape and size. They range from a slender spindle cell to a round cell. This difference in size and shape of the cell and in the structure of the growth, with a frequent tendency toward adenomatous arrangement, may be due to the fact that embryologically the cells of the basal layer of the epidermis are more closely related to the sweat glands and the sebaceous glands than are the cells of the more superficial layers of the epidermis.

CLINIC OF DR. STUART McGUIRE

ST. LUKE'S HOSPITAL, RICHMOND, VA.

CASE I. DEFORMITY OF NECK TREATED BY TRANSPLANTATION OF FAT

THE first patient to be operated on this morning is a young woman twenty-three years of age. When she was a girl of thirteen she states that she had some kind of an infection of her neck which produced such a great amount of swelling about her throat that a tracheotomy had to be done to prevent her from choking to death. After the operation she was given *x*-ray treatment over this region at intervals for a period of three months. As a result there was extensive ulceration of the skin covering the whole anterior surface of the neck. From this rather meager and indefinite history it is impossible to tell the character of the original disease, and it is, therefore, a condition, not a theory, with which we have to deal.

You will note that the skin over the front of the neck is discolored. It is of parchment-like thinness and tightly adherent to the sternomastoids and other muscles of the neck and to the larynx and trachea. This causes the patient to swallow with difficulty and to speak with a hoarse, muffled voice. All the adipose tissue beneath the skin of this area has been destroyed and the outlines of the various structures of the neck can be seen as plainly as in a dissected cadaver. The condition is not only annoying, due to difficulty in swallowing, but it is also extremely disfiguring, a circumstance of far greater importance to an otherwise very comely young woman. A thorough physical and laboratory examination has been made of the patient and no contraindications have been found to operation. I will, therefore, attempt to improve the voice, to relieve the

difficulty in swallowing, and to restore the symmetry of the neck by the transplantation of a graft of fat which I shall take from her thigh for this purpose.

The patient, as you see, is placed on the operating table in the position usually employed in goiter operations. The neck and thigh have been prepared in the usual way. Under general anesthesia I make a vertical incision through the skin in the midline of the neck from a point just below the chin to the upper margin of the sternum. I now carefully dissect the skin from the closely attached underlying structure, being careful not to puncture or buttonhole it, as it is very thin. These two lateral flaps when lifted bare the whole anterior surface of the neck. The dissection on each side has gone beyond the posterior borders of the sternomastoid muscles and finally reached healthy areola and fatty tissue. There has been very little bleeding. I would like to see more, for this means that the blood-supply to the skin is poor. I now lay folded gauze smoothly over the wound, and with scissors cut out a pattern which will be used in making a graft the proper size and shape to exactly fill in the defect. I pack the wound lightly and protect the whole field with a sterile towel.

Now to procure our graft. I make a linear incision on the anterior surface of the thigh, raise the skin, and so expose the underlying fat. The pattern of gauze is laid on the surface and its outlines followed in cutting the graft. Fortunately, the patient is young and well nourished, hence the adipose tissue between the skin and fascia lata is firm in consistency and of adequate depth. You will note, now the graft is free, that it is larger than my hand, and that it is about 1 inch thick in the center and becomes thinner at the margins. The wound in the patient's neck is now exposed and the graft placed in position. It fills the space nicely, the two lateral edges lying over the sternomastoid muscles, the upper end covering the larynx and the lower end filling in the depression behind the upper border of the sternum. No stitches will be necessary to retain the graft in position. The skin is closed over it with a continuous buttonhole suture of black silk. No drainage is employed.

You will note the symmetry of the neck is perfectly restored, and that the skin is separated from the structures to which it was previously adherent by a thick cushion of adipose tissue. There is, of course, a possibility that the graft may break down and have to be removed, but my experience with the transplantation of fat in other cases makes me believe that the graft will become vitalized and perform the function for which it was designed.

Note.—The patient made a rapid and uneventful recovery. There was no elevation of temperature and the wound healed by primary intention. A letter received from the patient nine months after the operation states, "The size and shape of my neck is normal, . . . the skin is whiter now than it was before the operation and is becoming whiter each day. . . . I am still somewhat hoarse, especially when I am tired, but my voice is stronger and clearer and I can talk louder than before the operation. . . . My general health is perfect and I have not had a cold or sore throat since Christmas."

CASE II. CONGENITAL HYPERTROPHIC PYLORIC STENOSIS

THE second patient is a breast-fed male infant just four weeks old. He presents all the classical symptoms of congenital hypertrophic pyloric stenosis. At birth this baby was apparently normal, but when about ten days old he began to vomit during or shortly after nursing. At first he simply regurgitated the milk, but later the vomiting became projectile in character. His bowels have moved several times each day, but the stools contain little or no food residue and consist chiefly of intestinal secretions colored with bile. He has lost weight and strength rapidly, although his condition is better than it was several days ago. This improvement is due to judicious treatment by a pediatrist to improve nutrition and correct acidosis. Examination shows a fulness in the upper abdomen. As soon as milk or water is taken a peristaltic wave can readily be seen through the thin abdominal walls. It starts at the cardiac end of the stomach and expends itself against the closed pylorus. I can distinctly feel a small olive-shaped tumor of cartilaginous consistency just to the right of the median line and under the edge of the liver. This cannot always be found, but is almost pathognomonic when present. An *x*-ray examination has not been made in this case because the diagnosis was so clear cut that it was thought unnecessary. It is often, however, the determining factor when the symptoms are less definite.

The symptoms of congenital hypertrophic pyloric stenosis are usually so plain that a diagnosis should not be difficult, yet I have been struck with the fact that in my personal experience all the cases on which I have operated have been referred to me by baby specialists, and in no instance has a case been brought to me by a general practitioner. This would seem to indicate that, as a rule, the family doctor is unable to recognize the condition with sufficient certainty to be willing to rely on

his own opinion. He either refers the case to a baby specialist or waits for it to get well or die under expectant treatment. No one appreciates the value of the various specialists in medicine more than I do. Almost daily I am indebted to one of them for advice that helps me out of a difficulty. But good baby specialists are rare and they are usually located in large cities, while babies are numerous and are specially prevalent in country communities, hence the general practitioner should be able to make a diagnosis of congenital pyloric stenosis without aid and with a certainty and assurance that will lead to prompt and proper treatment.

My early cases of pyloric stenosis were subjected to a posterior gastro-enterostomy, but since the introduction of the Rammstedt operation I have used it exclusively, as it is equally as effective and a much easier and safer procedure. The Rammstedt operation is familiar to you, but there are certain features of its technic which I have learned by experience to which I wish to call attention. Singly they may seem unimportant, but collectively, in my opinion, they will materially influence the mortality of this operation.

Instruments.—I believe it was Crile who said that in operating on a Lilliputian patient the surgeon should employ Lilliputian instruments. A watch cannot be adjusted with an ordinary screwdriver, and a six or eight weeks old baby cannot be satisfactorily operated on with standard surgical instruments. Every surgeon who does much work on babies should have a special kit of tools for these cases, consisting of small scalpels, miniature retractors, mosquito artery forceps, delicate needles and needle-holders, etc.

Special Operating Table.—A small baby placed in the center of an ordinary surgical operating table is a little bit of wiggling humanity who cannot be restrained by the usual straps or bandages, and who is so far from the edge and so low in the center that it is a back-breaking ordeal to carry out the steps of a surgical operation. If the little patient is placed on a feather pillow in order to elevate him and protect him from the chill and hardness of the metal or glass top of the table,

he soon sinks into a depression and little is gained. W. L. Peple, of Richmond, who has had a large experience in abdominal work on infants, has devised a simple and cheap accessory which can be placed on any ordinary table that overcomes the aforementioned difficulties. It consists of a small wooden table about 6 inches in height, 10 inches in width, and 24 inches in length, and has adjustable straps to confine the patient's arms and legs. By placing one or two bags filled with hot water beneath it and covering it with a small blanket the baby can be kept warm without danger of receiving burns. If this accessory table is not at hand, a satisfactory substitute can be improvised by using a properly shaped operating-room stool. No one who has not tried it can appreciate the added ease and comfort in operating on a baby elevated in the manner described.

Anesthesia.—As is usually the case when it comes to the subject of the anesthetic, there is a controversy. I personally dislike to work with local anesthesia, as it is time consuming and nerve racking, but after considerable experience with this special operation I have come to the conclusion that it should always be done by anesthetizing the operative field with novocain and pacifying the patient by means of a sugar rag. The last is a very important feature, and by means of it I have often operated on a baby without a whimper or outcry during the ordeal. The idea was gained by witnessing a Jewish circumcision, at which an assistant to the Rabbi held a cup of sweet wine which contained a number of boluses of sugar tied in linen or gauze. No local anesthetic was used, but each time the baby opened his mouth to cry a sugar rag was popped in, and the result was as effective as it was ludicrous.

Incision.—The abdominal incision should be made through the upper right rectus, over the region of the hard movable tumor if it can be palpated. This incision should not be over 1½ inches in length, as this is long enough to permit the delivery of the pyloric end of the stomach and not long enough to allow the protrusion of other viscera. If there is any difficulty in bringing up the thickened pylorus with the finger, it may be delivered with a blunt hook.

The obstruction to the pyloric opening of the stomach should then be relieved by dividing the hypertrophied tissue. The hard globular mass is held between the thumb and finger of the left hand, and a longitudinal incision is made through its least vascular part, beginning on the stomach side and cautiously ending over the duodenum. At one time surgeons were advised to use a very sharp knife and to dissect down accurately to the mucous lining. By following this practice I twice accidently opened the lumen of the duodenum. I have found that the easiest and safest way is to make an incision only partly through the cartilaginous-like tissue and then take the handle of the knife and make pressure in the line of the cut. The structure will break like the rind of a melon, and the cleavage between it and the underlying mucous membrane will at once be apparent. The cut edges of the incision are then spread out with forceps until the constricted mucous lining unfolds and the obstruction to the pylorus is relieved. I have never attempted to cover the raw surface of the wound thus produced in the pylorus with a piece of omentum, or with a plastic flap cut from adjacent tissues, as suggested by Strauss, and I have had no symptoms to develop which made me regret not doing so.

Suture and Dressing of Abdominal Wound.—It is not safe in closing the abdominal incision to trust to simple tier sutures with catgut. I know this to my sorrow. Patients with pyloric stenosis usually have impaired vitality and their tissues heal slowly. They are fretful, have frequent crying spells, and are likely to be distended with gas. All these facts make the possibility of the incision opening up greater than is the case after other abdominal sections. Therefore, in closing the incision two or three through-and-through silkworm-gut sutures should be inserted, including skin, fascia, muscle, and peritoneum. After these are in place the various structures should be approximated with catgut and then the silkworm-gut sutures tied. If adhesive straps are used to retain the abdominal dressings in place care should be taken that they are not applied too

tightly, as otherwise trouble may result by interfering with peristalsis and preventing the stomach from emptying.

Postoperative Management.—Few surgeons know much about the care and management of babies, and my experience has been that most babies do better if after operation they are not confined to bed, but allowed to lie in their mother's arms, and their feeding and medical treatment placed under the direction of a competent pediatrist.

CASE III. EXOPHTHALMIC GOITER

THE third and last case this morning is a patient with exophthalmic goiter. The woman is twenty-seven years of age, and her symptoms began about twelve months ago after nursing her mother through a long and finally fatal illness. The patient was first nervous and irritable, then began to lose weight and strength, and finally her heart became rapid and her breathing difficult after slight exertion. She noticed a tremor of her hands and later there developed the characteristic changes in her eyes. Examination shows a moderate symmetric enlargement of the thyroid gland. At first the patient was treated for nervousness, later it was suspected she had tuberculosis, but now it is evident she is the victim of hyperthyroidism. This diagnosis is made probable by the progress and development of her symptoms and is confirmed by her metabolic rate, which is 60 per cent. above normal.

The cause of exophthalmic goiter is not definitely known, but in many cases the disease seems definitely associated with some intense emotional disturbance. In the history of the cases that have consulted me I have usually been able to find the factor of fatigue, worry, anxiety, grief, fright, dissipation, or sexual perversion. This often may be a mere coincidence, but in some cases the relation of cause and effect cannot be escaped. I can recall at this moment 3 striking cases that have come under my own observation. One was that of a healthy young woman who was attacked by a negro man. Her husband responded to her calls for help and she witnessed the terrific fight that ensued, which resulted in the death of the negro. Ten days later she was brought to me with a severe hyperthyroidism which eventually necessitated a partial thyroidectomy. A second case was that of a Jewish woman who was admitted to the hospital with a diagnosis of fibromyomatous tumors of the uterus. A careful examination showed she was in good general condition. A supravaginal hysterectomy was

done and she made an uneventful recovery until a week after the operation, when she was wakened during the night by a scantily dressed male patient, who had gone to the toilet, and in attempting to return to bed had mistaken her room for his own. The woman screamed with fright and had violent hysterics. Her symptoms were at first supposed to be nervous, but they later developed into characteristic hyperthyroidism, and a second operation on the thyroid was necessary to effect a cure. The third case was that of an apparently normal woman who with a number of friends was inspecting a new hotel. When the party reached the culinary department they were shown the cold storage room, and as she was interested in something she saw she lingered behind the rest. Some member of the party playfully closed the door, and when an attempt was made to let her out, for some reason it could not be opened, and it was four hours before she was rescued from the cold and darkness of her imprisonment. When I saw her she had typical hyperthyroidism, one eye being so protruded that it was literally hanging on her cheek.

The present accepted methods of treatment in cases of exophthalmic goiter are rest, *x*-ray or radium, and surgery. There is no question that physical and mental rest and the use of *x*-ray and radium are beneficial, and if continued sufficiently long will in some cases effect a cure. If a patient has time and money and is willing to make a pet of a diseased gland and try to humor it back to a normal condition, then palliative measures may be tried, but I am convinced after a fairly large experience in treating hyperthyroidism that the safest, surest, and quickest way to effect a cure is by an operation. The practice of destroying a portion of a gland in order to lessen its physiologic activity does not seem based on good surgical principles, but it is the best that we can do until some chemical antidote for thyroxin is discovered. I think that an operation for hyperthyroidism is indicated as soon as a diagnosis of the disease can be established by the clinical symptoms, the metabolic rate, and Goetsch's test. It economizes time, saves expense, and avoids the danger of serious complications developing.

In the surgical treatment of toxic goiter I have abandoned ligations because, to my mind, they are illogic, and I have found them unnecessary in good cases and more dangerous than radical operations in bad risks. The mortality in thyroid surgery has practically now been reduced to acute postoperative hyperthyroidism. This is caused not by the amount of the gland taken out, but by the amount of the gland left in, and it can be best minimized by the removal of a large portion of the thyroid. It is not always safe to complete the operation at one stage and good judgment is necessary to handle bad cases. A few patients will not bear transportation, and should be operated on in their room without moving them from bed. Some do best under a local anesthetic, others require light nitrous oxid oxygen in addition. Often after the removal of the desired amount of glandular tissue it is wise to pack the wound and delay closure for twenty-four or forty-eight hours. Always it is well to provide for liberal drainage. I know that it is almost heresy to condemn ligations in these cases, but since my discharge from the army three years ago I have operated on 262 patients with goiter, with but 2 deaths, by the method described. I believe I have had my share of bad cases, and I have not dodged any of them.

CLINIC OF DR. HUBERT A. ROYSTER

REX HOSPITAL, RALEIGH, N. C.

THE ANTERIOR INCISION IN SECONDARY NEPHRECTOMY

THE patient before you is a woman aged thirty-two years upon whom I operated here two weeks ago. At that time she was not a safe surgical risk, and I had to content myself with opening and draining a perinephritic abscess through the lumbar incision.

Today she is in much better condition, and I purpose to remove the diseased kidney. The patient's history is rather interesting. She has been married ten years and has had one miscarriage. She appears to be inordinately desirous of children. For some two or three years she has been regarded as a psychopathic case, and very recently was discharged as unimproved from the psychiatric department of a well-known hospital. During her stay in that hospital she was the subject of consultation over the condition of her left kidney, but, probably on the ground that her psychosis was incurable, no surgical action was advised.

When I first saw her a few weeks later she had a high fever accompanied by chills and sweats, a tender fluctuating mass filling the left lumbar region, and projecting on the anterior abdominal wall, and a large amount of pus in the urine coming from the left kidney. Her mental symptoms were variable; at times she seemed perfectly sane, at others she was flighty, incoherent, even maniacal. She was at once removed to the hospital, and by lumbar drainage there was evacuated about 1 pint of foul pus containing the colon bacillus. Following this her improvement was prompt and marked both mentally

and physically. But after ten days her mind again became disordered, and her septic state returned. The wound had almost ceased to drain.

I shall now undertake to remove the left kidney, which I feel sure is destroyed. Secondary nephrectomy for any cause, and at any time, is an uninviting procedure. If any of you have never tried it, or seen it tried, take the word of one who has had at least some experience, and when you go in, be prepared for the worst. So difficult do even the most practised operators find the second attempts, that they will run the greatest risk to avoid them, to the extent of getting the kidney out at the first sitting, if possible, sometimes endangering the life of the patient. This, unhappily, is often the case. It is similar to the fate of the base-runner who tries to stretch a single into a double, only to be put out at second. Particularly trying are the secondary nephrectomies when done by the usual method of going through the former scar in the loin. Dense cicatricial tissue is encountered; tight planes of plastic exudate are in the way; and the direction of effort is from infected into clean areas, with anatomic relations completely altered.

It has occurred to me that we may approach this kidney more readily through an incision in the abdominal wall, and get at it from its clean side, and drain posteriorly through the former incision. Accordingly, I am making a left rectus incision beginning high up, and extending downward about 6 inches. I am going right through the peritoneum, and will pack off very carefully, drawing the descending colon far inward. Picking up the posterior peritoneum above and below, I incise it and expose the kidney. I find no difficulty in getting hold of it, because its free convex border is not adherent. Small packs are placed in the subperitoneal space around the kidney.

Fortunately, the ureter is easily secured and doubly ligated; then two pairs of large clamp forceps are placed at the hilum and the kidney cut away. The opening through which the kidney had ruptured was found to be near the lower pole, and was completely covered by the forceps, so that practically no pus has escaped. The pedicle is ligated, a cigarette drain is

introduced through the former wound in the back, the peritoneal layer is closed, and the abdominal incision is sewed up as usual. The procedure was executed easily and quickly. The kidney is nothing but a pus sac, showing hardly a vestige of parenchyma. While I would not recommend the anterior abdominal incision for the majority of kidney operations, I believe it was of distinct value in this case, and *I propose it as the procedure of choice in secondary nephrectomy*. Its advantages were readily seen as I went along—approach to the kidney on its free aspect; ease of manipulation away from scar tissue; clamping and ligation of the pedicle before getting into the septic cicatricial field. The danger of re-infection of the peritoneum can be ruled out if ordinary precautions be observed and the practical self-immunization of the patient be taken into account.

Note.—This patient made a satisfactory recovery from the operation. Gradually her mental condition cleared up, and she is now perfectly rational, wondering where she "has been all these years." The kidney was evidently the focus of infection which produced the mental unbalance. Soon after her last operation she became pregnant, but developed uremic signs, and her physician very wisely had the pregnancy terminated.

CYST OF PAROTID GLAND: EXCISION

MRS. J. T. T., forty-six years of age, has an oblong mass in front of her ear and extending downward on the neck. It is of eighteen months' duration, has given very little pain, and its rate of growth has been slow. There is no history of injury or of any trouble within the mouth. You can clearly see that it is almost 5 inches long and 1½ inches wide; it is thin

Fig. 487.—Cyst of parotid gland.

walled and definitely fluctuating, with its point of fixation above. It is, I consider, a cyst of the left parotid gland (Fig. 487).

I shall attempt its removal according to a plan devised by Sistrunk of the Mayo Clinic. The incision goes obliquely along the neck below the line of the lower jaw, and across the lower pole of the cyst (Fig. 488). The skin is dissected back and retracted sharply forward by blunt dissection, going between

the superficial and deep branches of the facial nerve (Fig. 489). The cyst is so deeply embedded that I must remove a portion of the gland with it, and, unfortunately, it has ruptured just as I had it almost out. But this is of no great significance.

Fig. 488.—Incision along crease in the neck which is employed in the removal of parotid tumors (Sistrunk).

The wound will be closed with a subcuticular catgut suture, leaving a drainage strip of rubber-dam protruding at the lower portion. The fluid from the cyst is thin and watery, not as viscid as is usually found in such cases.

Cysts of the parotid are rare. You have seen tumors of the gland removed in our clinics, but most of them have been of the so-called "mixed" variety. We have had about 18 altogether. Two of them were frankly malignant sarcomata; the one just removed is the first cyst we have seen; the rest were

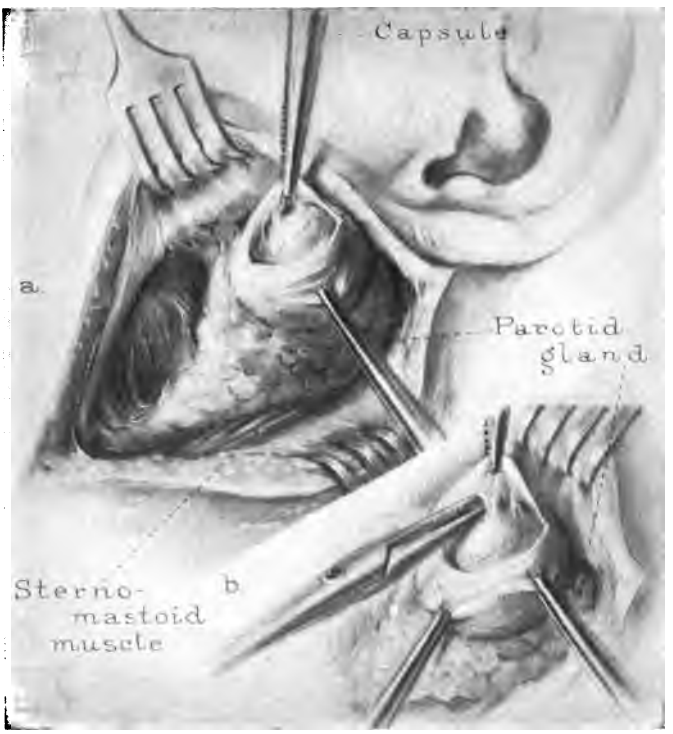

Fig. 489.—*a*, Skin and platysma muscle reflected and the parotid tissue covering the tumor incised in the direction of the fibers of the facial nerve. *b*, Enucleation of tumor by blunt dissection with a pointed hemostat. (Sistrunk.)

mixed tumors. Cysts of the salivary ducts and their glands are only of occasional occurrence; those of the glands themselves are more rare. They are probably due to closure of the smaller duct branches from inflammatory action, or cicatricial contraction due to slight injury. Now and then two or three smaller dilatations coalesce to form a larger cyst, as in the case

presented. The diagnosis offers no difficulty in a cyst of this size, but when small it may be impossible to determine whether a cyst is secondary to a new growth.

Injections of zinc chlorid, tincture of iodin, or carbolic acid have been used, but the best treatment is enucleation of the cyst.

This is my first experience with the Sistrunk incision. It commends itself to me for the ease of performance, for its rational promise of avoiding injury to the facial nerve, and for its cosmetic results. (There was no sign of facial paralysis when this patient was dismissed two weeks later.)

THE SIGMOID ADHESION

AGAIN I bring to your attention a case illustrating the significance of adhesion and kinking of the sigmoid flexure. My interest in this affection was first aroused in 1909, when, after removing, without benefit, the adherent left tube and ovary of a woman who was suffering with left-sided pelvic pain, I opened up the abdomen six months later and discovered a well-marked kink of the sigmoid (undoubtedly present previously) and gave her complete relief by cutting and suturing the adhesive bands. I then became convinced that this lesion accounted for many cases of left-sided pain in women, and that the ovary was blamed unjustly for much of the symptomatology. Since that time we have formulated a group of signs which are characteristic of the sigmoid kink. The typical signs are constant left-sided pain, usually low down in the iliac region, or, more rarely, higher up toward the rib border; occurring in acute exacerbations and increased during defecation; a sense of stoppage of the bowel current at a definite point; constipation as a rule, but occasionally alternating with frequent mucous stools. Physical examination adds nothing to the diagnosis save the exclusion of pelvic disease; for, while the adhesion may be associated with tubal and ovarian affections, it is not such conditions that concern us in the typical case which occurs independently of surrounding pathologic processes.

The majority of the cases are correctly diagnosticated. Sometimes the condition is not found in the presence of definite symptoms; at other times it may not be suspected, but discovered after opening the abdomen. This patient upon whom we are about to operate—Mrs. B., twenty-eight years of age, the mother of two children—was sent to the hospital for ovarian disease. We failed to find any pelvic lesion, and made a diagnosis of sigmoid adhesion, on the basis of a dragging left-sided

pain, increased on defecation and accompanied with obstinate constipation.

Making a rather long abdominal incision, a trifle to the left of the median line, I drop the patient in the head-down position, pack off the small intestine, and pull up the sigmoid. It is anchored below, adherent over the edge of the broad ligament, and kinked as it turns over the pelvic brim (Fig. 490).

Fig. 490.—The sigmoid adhesion as typically seen involving the fallopian tube.

It is important to know the normal bend of the sigmoid at this point, and this can be determined by observing carefully its relation every time the abdomen is opened for any cause. I draw up the flexure, making the adhesion taut (Fig. 491), and, placing forceps diagonally toward its center, I cut between them. This transverse incision is then pulled apart

by the forceps and sutured longitudinally—the principle employed in plastic surgery everywhere—covering all raw surfaces with peritoneum (Fig. 492). The sigmoid now drops down into its normal position behind and below the broad ligament, with its kink obliterated. No other lesion is present within the abdomen.

Fig. 491.—The sigmoid is raised on the forceps, showing depth and extent of adhesion.

We have now somewhat over 100 of these cases in which the sigmoid was the sole lesion. About 90 per cent. of them have been relieved of their symptoms; most of the others have improved; a few have derived no benefit. Larger experience has convinced me the more surely that this condition is a real clinical entity, to be reckoned with, recognized, and treated according to definite principles. (Mrs. B. made a good re-

covery, and apparently has been cured of her constipation. For the first time in years her bowels are moving daily without

Fig. 492.—The adhesion has been divided crosswise between forceps and is being sewed up longitudinally with interrupted catgut sutures. This allows the sigmoid to drop away from the tube and underneath the broad ligament.

assistance, and this in spite of the fact that she is lying in bed and is living on a limited diet.)

CLINIC OF DR. HUBERT A. ROYSTER

ST. AGNES HOSPITAL, RALEIGH, N. C.

(FOR COLORED PATIENTS ONLY)

PROOF OF CURE IN A CASE OF TUBERCULOUS PERITONITIS

A PATIENT has just been admitted, and we have asked that he be brought up for immediate operation. He is a boy nineteen years of age who has sustained a pistol-shot wound of his abdomen. This is, of course, a very serious matter, but a most interesting feature of his case is that three years ago I operated on him for tuberculous peritonitis. At that time he was a thin, frail sixteen-year-old boy exhibiting a constant, but slight elevation of temperature, and having a belly tightly distended with fluid.

Under local anesthesia I made a small median incision in the abdomen and evacuated the fluid. The entire peritoneum, visceral and parietal, was studded with tubercles. No particular focus was discernible. The incision was closed without drainage. A prompt recovery followed the operation, and the patient's improvement has been continuous and progressive.

For two years we have not heard from this boy until just a few minutes ago. Naturally, I am interested to know what we shall find in his abdomen. About six hours ago he engaged in a riot in another town, and was shot at close range with a pistol. He is in great pain, his abdomen is tender and somewhat distended, and his pulse is rapid. There is a bullet wound in the abdomen 4 inches to the left of the umbilicus and 1 inch below it. I am making an incision through the left rectus muscle. Within the abdominal cavity there are blood (both liquid and clotted) and extravasated feces. Hastily lifting up the intestines

I suture the perforations as fast as I find them. Eight holes are in the small bowel, and there is one through the mesentery, which has been bleeding freely. Having closed these openings, and no more turning up, I proceed to mop out the cavity and to inspect the other viscera. None of them is injured. *Remarkable to note, there is not a sign of a tubercle, not the remnant of an adhesion!* The omentum is normal, the appendix is sound, the peritoneum is smooth. It is a confirmation of the cure of peritoneal tuberculosis, brought about by the simple and well-known method of evacuation of the fluid. While our results at this hospital have been good enough to justify this procedure, and while we have a number of apparent recoveries now under observation, nevertheless this case is the only one in which I have had the opportunity of proving the absolute disappearance of the disease from the abdominal cavity. (The boy got well, and has been sent over to the State Prison to begin serving his sentence.)

LIPOMA OF THE POPLITEAL SPACE: DIFFERENTIAL DIAGNOSIS

A COLORED man, forty-three years of age, presents himself for examination on account of a "swelling back of his right knee" (Fig. 493). It has been variously called a "tumor," an aneurysm, a joint cyst, etc. The swelling is ovoid in shape; firm, but giving a sense of indistinct fluctuation; shows definite pulsation, non-expansile in character, which ceases when the mass is pulled away from the vessel; is markedly circumscribed, has raised edges, and, on pressure, exhibits pitting and lobulation. This mass has developed slowly and is painless, but disables the man in his work.

What is the mass, and how shall we treat it? We believe it to be a fatty tumor on account of the characteristics just enumerated, and we shall proceed to remove it. A longitudinal incision over the swelling at once exposes the yellow lobulated fat with trabeculæ running irregularly through it. The removal is easily accomplished, and after the insertion of a strip of rubber tissue for drainage the incision is sutured.

The differential diagnosis of enlargements in the popliteal space is not always an easy matter. Our first thought, of course, must be aneurysm, and with the history, the pain, the expansile pulsation, diminution in size and cessation of pulsation produced by pressure upon the artery above, the delayed pulse in the leg and foot below, and auscultation of a blowing murmur over the swelling—all these phenomena would make for the diagnosis of aneurysm. A positive Wassermann reaction would help to confirm the opinion; but it must not be forgotten that while practically all aneurysms are due to syphilis, a patient may have syphilis and no aneurysm. Other affections in this region are to be considered. Sarcomata under great vascular tension are found in the popliteal space, and if, as is the rule, they spring from neighboring bones, the *x*-ray will be of assistance. Abscesses from lymphatic suppuration, or of tuberculous origin,

or as a result of metastatic infection must be taken into account. Cysts are generally associated with popliteal bursæ, the most important one of which lies under the tendon of the popliteus muscle. When chronically inflamed this bursa may give rise

Fig. 493.—Fatty tumor of the popliteal space, simulating aneurysm.

to a large cystic mass, which is deep seated and fixed, and frequently causes interference with walking. It may communicate with the knee-joint, causing through-and-through fluctuation. Two cases of cystic popliteal bursitis have been observed in this clinic, one a single large mass difficult of differentiation

until aspirated, and the other accompanied by several bursal cysts on the anterior and inner aspect of the knee.

Genuine tumors of the popliteal space are exceedingly rare. The lipoma that we have just excised is the only one on record in our service here. It may be impossible to distinguish a lipoma from a tight bursal cyst. The latter is generally less movable, and the former will show puckering of the skin when compressed from side to side.

TUMOR SPRINGING FROM THE UNDER SURFACE OF THE LIVER

HERE is a tumor which I have just removed from the under surface of the liver. It was found accidently during the course

Fig. 494.—Tumor springing from under surface of the liver.

of an abdominal hysterectomy for fibroid tumor. Reaching up in the routine palpation of the upper abdomen I felt this

mass, the size of an ordinary cocoanut. At first I thought it might be a detached growth from the uterine fibroid; but it was entirely apart, and had its origin high up; it was hard, smooth, and pedunculated.

I enlarged the incision upward and discovered that the tumor pedicle, about 1½ inches long, came off from the liver, back of the longitudinal fissure. The attachment was superficial, apparently a prolongation of the obliterated remains of tissue about the ductus venosus, existing merely as a rounded fibrous cord. I transfixed and tied the pedicle and removed the tumor (Fig. 494). You will see that it is most likely fibrous in character. This is one of those very rare benign growths in this region, originating in obsolete connective tissue, just how or why, no one knows. It is more or less a "freak" case, and is of no special importance, except for its origin and its rarity. (Section of the tumor later proved it to be a pure fibroma.)

EPITHELIOMA AND SEBACEOUS CYST OF THE SCALP SIDE BY SIDE

THIS woman, about sixty-five years of age, sent up from the dispensary, shows the rather interesting coexistence of an epithelial growth of the scalp alongside a sebaceous cyst. She states that for several years she had two "wens," and that in the effort to avoid them when dressing her hair she invariably

Fig. 495.—An epithelioma and a sebaceous cyst of the scalp side by side.

struck one with the comb. Finally breaking down occurred, and for six months the condition which you see has been present (Fig. 495). Though it is not often that scalp cysts degenerate into malignant growths, here the effect of repeated slight traumatism seems to have been manifested. (Both tumors were excised, and the vegetating mass was found to be an epithelioma.)

CLINIC OF DR. F. W. PARHAM

CHARITY HOSPITAL, NEW ORLEANS

ABSCESS OF LIVER; RESECTION OF NINTH RIB; ABSENCE OF ADHESIONS; TRANSPLEURAL OPERATION

THIS patient, a white male, aged forty-two, was transferred to my service June 16, 1922, from the medical division, where he had been under observation since his admission on June 8, 1922.

When he entered the hospital he complained of stomach trouble and diarrhea. His family history was good; he had whooping-cough and mumps when a child, and influenza in 1921, being sick about two weeks. His venereal history was negative and his Wassermann negative. He stated that about twenty-one months ago he began to have looseness of bowels, with great straining, having at times as many as fifteen or twenty movements a day, with occasional passing of blood and mucus. This irregularity of bowels has continued, with remissions of variable duration, for the past twenty-one months, and he asserts that he has lost about 35 pounds in the past twelve months. Amebæ were suspected as the cause of the dysentery, but have not been found. While he was in the medical service, about June 15th, an exploring syringe was used in the eighth intercostal space, obtaining a thick, creamy pus, which showed in smears, and on culture, the colon bacillus.

He was transferred to my surgical service on June 16th. My intern gave me by phone the facts of the case, and I had him prepared for operation this morning. He appears quite haggard, emaciated, and is apparently a bad surgical risk. His leukocytosis on June 15th was 23,250, polymorphonuclears 83. The bowels are still loose, though somewhat better. There is dulness on percussion over the liver well up into the axilla,

nearly to the fifth rib in the nipple line, and very slight enlargement below the costal arch. There is some tenderness in the eighth and ninth intercostal spaces, though not marked. While in the medical ward his temperature had been as high as 102° F., but the febrile movement had not been marked. As colon bacillus had been found in the aspirated pus, and no amebæ, with a high leukocyte count, I make the diagnosis

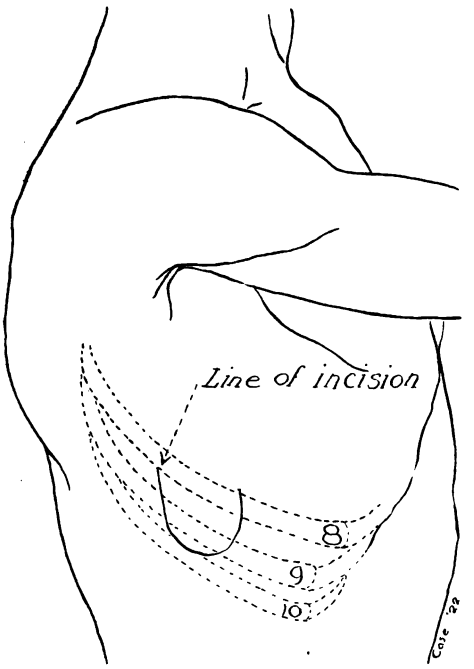

Fig. 496.—Case I. Outline of flap.

of abscess of the liver, bacterial in origin, probably a sequence of the dysentery. The prognosis is, therefore, unfavorable, as there is a probability that we have to deal with a septic abscess rather than with the old classical, single, tropical abscess of Murchison, which we now know to be amebic. The condition of the man will not justify a general anesthetic, so the whole procedure will be carried out under local analgesia, using ½ per cent. apothesine with adrenalin 4 drops to the ounce.

The Operation in Detail.—I proceed first to locate the abscess as accurately as possible. You will observe in the *x*-ray plate that the diaphragm is pushed up to the eighth rib. We see here the little puncture scar of the previous exploration

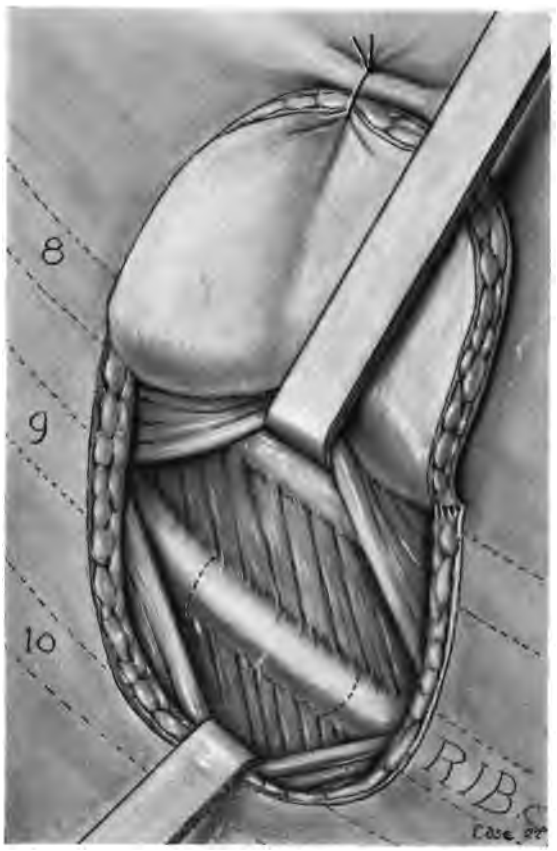

Fig. 497.—Case I. Flap lifted and tacked to skin.

which found pus. I shall, therefore, put the needle in at the same spot, which I have now anesthetized. See, the syringe draws creamy pus. This is in the ninth intercostal space, mid-axillary line. In order to be sure which rib to resect I shall explore also *above* the ninth rib. If I find pus, then I shall

resect that rib; if I do not, I shall try the tenth space. You see the pus coming into the syringe from above the rib. So we shall resect the ninth rib. I have blocked the intercostal nerves concerned, and can now proceed with the operation. I shall make a curved incision, convexity downward, so as to make accessible also the eighth and tenth ribs if I need more room (Fig. 496), which is quite possible if we find no adhesions. Now you see the flap dissected upward. I stitch this with a suture to a fold of skin high enough to hold the flap out of the way (Fig. 497). I now cut through the muscles, expose and clean the rib of periosteum (Fig. 497). I carry this combination periosteotome and costotome under and cut the rib, I push it back about 1½ inches, and cut again. You observe that I have opened the pleura and exposed the diaphragm. The pleural cavity is wide open, but you notice the expected noisy pneumothorax has not developed, his breathing being quiet and easy. I am sewing the diaphragm up to the muscular tissue, catching up the pleura in such a way as to close the opening. The two end sutures pull the diaphragm up and fasten it to the cut ends of the rib. The diaphragm is now opened by a free incision, exposing the liver, which you notice is not adherent. I must, therefore, close off the peritoneal cavity by suturing the liver to the diaphragm. I have now done this and am prepared to open the liver. The needle goes in at least 2½ inches before we draw pus. The pus is, therefore, deeply seated. I shall pack around the space here with gauze and then incise the liver, using the suction apparatus as we do so. With a trocar and cannula attached to the suction apparatus this could be more safely done, but we have not that at hand. I have now a free incision, and you see the pus pouring out. This is sucked up quickly as it comes. The tension being relieved, we push a gauze pack into the liver and insert a finger so as to lift the liver forward and make a quick buttonhole suture to reinforce the previous suture of the liver to the diaphragm. The suture of catgut goes through liver, diaphragm, and muscular tissue. You see we now have pleural and peritoneal cavities completely shut off. There is no danger of contamination of either cavity. Perhaps a larger

opening would be better, but he is very feeble, and I shall content myself with this. The cavity of the abscess is emptied by suction as well as possible, and is packed with iodoform gauze saturated with balsam of Peru in castor oil (1 to 8), which we find an excellent plan. It can sometimes be left in with advantage for five or six days. We rarely use a drainage-tube.

I finish the operation by bringing down my skin-flap and suturing it partly to the edge of the wound, leaving just what

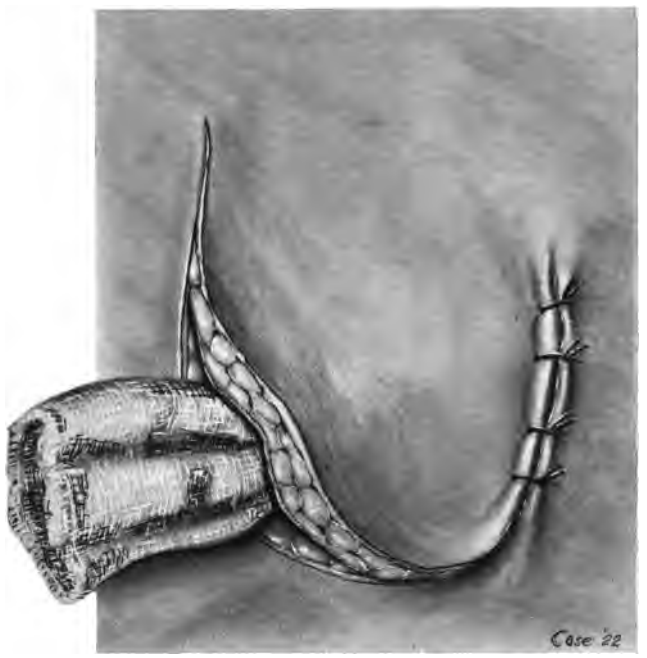

Fig. 498.—Case I. Flap brought down and sutured on one side.

we would have if we had made a slightly curved incision (Fig. 498). The advantage of the flap I have made in this case is obvious.

My patient has apparently suffered very little, and leaves the table in excellent condition.

Note.—The pack had to be removed after three days. The cavity was gently wiped out with long laparotomy sponges,

and the oil and balsam pack renewed. After a few daily dressings the oil and balsam were discontinued on account of their tendency to produce a diarrhea. He appears now to be improving. The pus at operation was examined and showed no organism, and remained sterile on culture. It is probable, therefore, that the abscess was, after all, amebic, and not a septic multiple abscess. We, therefore, gave him a few doses of emetin. The prognosis has decidedly improved. The abscess is steadily contracting and the discharge is constantly diminishing, his appetite and, consequently, his strength gaining every day.

September 4, 1922: The patient is now nearly well and will soon be discharged.

INFECTED CHARCOT JOINT, NOT AT FIRST RECOGNIZED AS SUCH, TREATED BY THE WILLEMS METHOD[1]

W. B. Admitted March 21, 1922. Common laborer, aged forty.

Complaint: Swollen knee.

Family history: Nothing of importance.

Past history: Usual diseases of childhood. Malaria thirty years ago. Gonorrhea twenty-two years ago. Denies syphilis.

He came to us from a hospital in another city. When I first saw him his knee was much enlarged, and at one point on the inner side, in the line of a scar of a previous operation, there was a small wound from which issued a rather free sero-purulent discharge. This opening was made in the accident room on admission before he was sent to the ward.

The knee was quite enlarged, but uniformly, and evidently contained a large amount of fluid, which was slowly oozing away. Some of this fluid was sent to the pathologist, who reported "smear showed many pus-cells and streptococcus, which on culture proved to be a non-hemolytic streptococcus." His general condition was unsatisfactory, he was emaciated, but physical examination was normal, except that his right pupil was larger than the left, neither reacting to light nor accommodation, and the knee-jerks seemed absent.

He stated that some eight or nine weeks previous to admission he had caught his foot in a board walk and injured his knee. He was taken to a hospital, where he remained for some days. I wrote to the surgeon who operated on his knee, and received the following reply:

"This man was sent to us by the manager of a blowpipe company, who stated that he had received an injury to his knee some time previously. At the time we saw him he had

[1] Presented before a clinical meeting of the Orleans Parish Medical Society, May, 1922.

considerable swelling at the knee and some fluid, the ligament torn, and the patella dislocated to the outer side. The joint was aspirated on several occasions, a straw-colored fluid being obtained. He was put to bed, and after a considerable rest we operated upon his knee. The patella was put back in place and sutured with chromic gut. The leg was put up in a splint and kept this way for ten days. . . . The swelling practically disappeared, . . . and when the stitches were removed there was no sign of infection. We were expecting to put the limb up in plaster, but he became unruly, got out of bed and removed the splint, and deserted. He appeared ten days later, when the patella was found displaced again, the leg and joint considerably swollen, and the wound showing some signs of infection." He left, and then came down to Charity Hospital.

Feeling that the infection of the joint would bring about serious damage, I concluded to carry out the Willems plan of treatment. I operated before the Polyclinic Class March 23d, two days after admission. I said at that time that this seemed to me the best thing to do to save the joint function, as the method of Willems has now demonstrated itself to be a thoroughly surgical method, having given remarkable results in the preservation of function in even severe gunshot injuries of the knee. The procedure consists in laying the joint freely open on both sides, and depending for drainage entirely upon the voluntary use of the muscles, whose compressive action on the joint make it quite unnecessary to insert drains of any kind. But the success of the treatment depends largely upon the vigilance of the surgeon and attending nurse, whose strenuous endeavor must be to gain the co-operation of the patient in exercising his muscles, beginning as soon as consciousness follows the passing off of the anesthesia. At first the faintest wriggle of the thigh muscles would be the only manifestation of muscular action, but persistent and determined urging would be rewarded by a slowly increasing voluntary movement and progressive improvement in drainage. This point is greatly stressed by Willems as a *sine qua non* for success. Faintheartedness on the part of the surgeon means failure. One

must be content with very little response at first, but earnest co-operation with the efforts of the nurse would very soon bring about heartening signs of real progress. Passive movements by nurse or surgeon were of little avail, everything was involved in the honest co-operation of the patient. Willems and his followers had thus treated numbers of serious gunshot and other injuries of the knee. It seemed to me reasonable and feasible, and I determined to carry out his directions *secundum artem*.

I made the incisions according to the directions of Willems, carrying them well up to the top of the synovial sac. My patient was querulous and fault-finding, and I anticipated a hard fight with him. I put on a dressing without splint and sent him back to his ward, with many misgivings.

Great was my surprise when on the morrow I walked into the ward and asked him if he had been carrying out my directions. He replied, "Yes, sir, I have been moving it," and showed me how vigorously he could bring it up in flexion to less than a right angle, and quickly extend it. He did this repeatedly for me without apparent pain. The drainage was profuse and all that could be desired. I had to caution against too exaggerated movement, because in spite of the drainage the knee seemed to be enlarging. In a few days posterior dislocation was evident, and the movements of the knee had to be discontinued and extension put on to overcome the dislocation. In addition, we kept the joint saturated with an emulsion of Bulgarian bacilli to combat the infection, suggested by an orthopedic confrère whom I had called into consultation. This seemed preferable to the Carrel-Dakin by reason of the difficulty of keeping the fluid in the joint on account of the wide openings.

It now became quite evident that we were dealing with something more than a simple infective arthritis. A more careful investigation was now made. The blood Wassermann was negative, but the spinal fluid was strongly positive, globulin ++++, and the colloidal gold test showed a paretic curve. It suddenly dawned upon us that we were dealing with a Charcot joint. Dr. H. P. Daspit, neurologist, was called, and made the following report:

"Narrowing of left palpebral fissure, left side of face slightly weak. Pupils dilated R>L. No reaction to either light or accommodation. Optic disks pale, gray. Seems to be annoyed with diplopia. Ocular balance grossly negative, not specially tested. Deviation of tongue to left. Tremor. Tendon reflexes of upper extremities not elicited. Right knee- and ankle-jerks absent (repeated examinations). Left could not be tested. Distinct ataxia right leg (heel-knee test). Absence of tactile response midthorax, bilateral, and of segmental distribution. Marked reduction in conductivity time (pin pricks) in legs. Absence of vibration sense in legs. Gait and station could not be tested. History of diplopia, leg pains, loss of sex reflex. Clinically, neuroluetic, tabetic type. The arthropathy regarded as Charcot."

The striking feature of the case is the absence of tenderness and the painless movement. There is as yet no evidence of bone change.

The febrile movement has not been conspicuous, although he has from time to time had exacerbations of temperature, once going up as high as 104° F. The drainage until recently has been excessive and the enlargement of the knee very great. Now, however, the discharge has much diminished, one incision has healed and the other nearly so, and the knee is smaller. I concluded that resection and fixation for ankylosis was not promising, and proposed amputation above the knee as the shortest way out, but this he positively refuses.

You will observe, now that the weights are off, the exaggerated backward dislocation of the knee and its great mobility (Fig. 499). As he will not consent to amputation, and the discharge is yet too free to make a plaster-of-Paris fixation desirable, I have decided the best course to pursue will be to apply a Thomas splint with lower fixation in the heel of the shoe, after the plan of a walking caliper. He is having weekly neosalvarsan injections.

The problems presented by this case are interesting. This is apparently a case of luetic tabes, but the experiments of Eloesser on cats seem to show that exactly the same phenomena follow simple section of the posterior roots, but trauma appar-

ently is necessary to localize the arthropathic trouble. Charcot's idea was that a degenerative change in the posterior roots and nerves occurred as a result of the tabes of the cord and the arthropathies followed. Eloesser's experiments demonstrated that analgesia resulted from the nerve degeneration, thereby removing the natural warning of danger, and trauma easily occurred and initiated the joint disorganization. [1]

Cotton has called attention to the necessity of doing something for these cases. All that can be done is to accomplish fixation and treat the tabetic condition. They should by all means be protected from trauma. The advisability of resection

Fig. 499.—Case II. Lateral view, showing complete backward dislocation at knee when extension was removed.

of the joint with the object of getting ankylosis is not clear, as the reparative power is undoubtedly much in abeyance, and yet the question will arise in infected cases like this as to some urgent surgical procedure. I have gleaned little assistance from the literature. The one certain thing is fixation by cast or surgical appliance, and this should be done early and effectively. Often we learn more by our mistakes than by our successes. I have brought this case before you because from this point of view it has been interesting and instructive.

[1] Leo Eloesser, Annals of Surgery, 66, 201, August, 1917; Jour. Amer. Med. Assoc., 77, 604, August 13, 1921.

FRACTURE OF THE PATELLA

THIS patient, Miss O. D., aged forty-nine, was admitted into my service March 24, 1922. She states that she fell and hurt her knee March 15th last. When I saw her in the ward the morning after her admission I found her without retentive apparatus of any sort. Her knee was much swollen,

Fig. 500.—Case III. Showing wide separation of fragments.

Fig. 501.—Fracture of patella.

painful, and quite tender on pressure and slight manipulation. Examination at that time showed a transverse fracture of the patella, the *x*-ray picture (Fig. 500) confirming this.

I did not think it advisable to operate at once, but put on a posterior splint with elevation of the leg, and concluded to defer operation a few days, hoping to reduce the engorgement somewhat. The swelling is now much less, but there is,

you see, still considerable enlargement of the knee as compared with the other. This is due partly to extravasation into the joint, but also to extensive inflammatory infiltration of the soft parts. Operation after this lapse of time (fifteen days) is not so promising, owing to the greater traumatism involved in clearing out the partly organized clot and the stiffness of the tissues from the infiltrating exudate, making coaptation of the fragments more difficult.

If the mechanical difficulties of reposition and fixation are at that time increased, it is not so certain that the dangers of infection are enhanced. Dr. Murphy used to teach that it was safer to wait at least five days before operation (Clinics of John B. Murphy, August, 1915, p. 769) in order to give time for the "traumatic inflammatory reaction to become established in the knee." He held that "the products of the reaction obstruct the lymphatics and fill the tissue spaces, thus greatly diminishing the danger of postoperative infection." Indeed, he practised injection of a 2 per cent. formalin-in-glycerin solution in all cases of operation upon the knee in order to produce thus chemically this desired inflammatory reaction if it were not already present as the result of injury. This has not been our practice. We have usually operated at once if the general condition of the patient permitted. In the present case a period of fifteen days has elapsed since the accident, and because the true nature of the case was not recognized, the case has been practically without care until admission to the hospital. Immobilization and rest have been of decided benefit and the case is undoubtedly more favorable for operation than a week ago, when it was first seen by me.

Operation.—Before proceeding with the operation I wish to emphasize the great difference in operative risk between joint surgery and abdominal surgery. Lawson Tait once said that he put his hand into the sacred cavity almost with the same impunity as he thrust it into his pocket. Not so with a joint; the reaction to irritation is much more prompt and far reaching. We must here observe the most scrupulous care. Some one has well expressed it in these words: Prepare your

hands with the utmost surgical carefulness and then act as if they were dirty.

I now make a transverse incision not directly over the line of separation, so that the lines of approximation of bone and skin will not lie in the same plane. Dr. Murphy preferred a longitudinal incision, but I have always done the transverse cut. You observe as we reach the bone a good deal of dark, clotted blood, some free and some well incorporated with the tissues, so that it is difficult to remove thoroughly. I now catch up each fragment of patella with a sharp catspaw retractor and pull them widely apart, thus freely exposing the interior of the joint. You see I am removing a mass of old blood-clot. This is accomplished by irrigation with salt solution assisted by gentle mopping out with wet gauze, keeping the hands, although gloved, religiously out of the joint. You notice a rent in the capsule at each side of the patella. If this capsular ligament were not torn there would be little tendency to separation of the fragments and a good functional result could be expected by mechanical treatment, but we could not be sure of bony union, owing to portions of capsular or periosteal tissue dropping between them. The impossibility of ascertaining this without opening the joint rather counsels open operation as the routine, except in those too feeble by reason of disease or infirmity of age to justify the risk.

The patella being a sesamoid bone, developed in and as a part of the quadriceps tendon, it is rare that we have the injury confined to the patella itself; usually there is a considerable rent in the capsule as well, and it is, therefore, as important, or even more important, to attend carefully to the repairing of this tear. Indeed, the operation which I prefer and have done in nearly all my cases has to do with the suturing of the capsule on each side.

You observe now all bleeding is stopped, and I shall proceed with the operation. I am now trimming off all shreddy and redundant tissue that may otherwise interfere with accurate coaptation. See, the two fragments now come together. It is important to get the lateral edges exactly in line so as to

preserve the contour. I now take a strong surgical needle, threaded with No. 2 chromic catgut, and pass it deeply through the capsule close to the inner side of the upper fragment, then through the capsular tissue of the lower fragment, always hugging the bone. The outer edge is treated similarly. The ends of the suture on each side are pulled up taut, and the fragments are pushed together into accurate apposition. I tie the suture on one side while my assistant does the same on the other. Another suture is put in through the capsule further away on each side, and, if necessary, a third, until the rent is completely repaired. Several interrupted sutures are now being placed through the soft tissues in front of the patella so as to maintain coaptation of the anterior edges of the patella. You see we have now good, even contact of the fragments. The wound is now closed by a few deep sutures of chromic gut passed through the fibrous tissues, but not including the skin. The skin is closed with silkworm-gut and a few Michel clips. You see the wound is closed and there is no drain. Only a small opening is left unsutured to permit escape of the small amount of serum that will escape in the first twenty-four hours. The inflammatory edema will quickly hermetically seal the wound. It is an error to tie tightly, for you thereby run the risk of a necrosis, which will favor the development of infection. Drainage in these cases invites infection. You are doubtless familiar with the teaching of the late war, that if you get a wound in the period of contamination you can cleanse and débride that wound and close primarily, but if you wait until the stage of infection has begun, you can do nothing until that infection has been subdued by appropriate treatment. Here, having no infection, we close the wound and prevent it.

Now as to the after-treatment. You see we are applying a generous dressing and a posterior plaster-of-Paris splint to put the knee completely at rest. We shall aid this splint by elevating the foot and leg on a pillow after she is in bed to relax the quadriceps. We shall keep this leg thus immobilized for two weeks; then in the third week we shall remove the splint and leave only a thick pad of cotton, thus permitting slight motion. I

shall direct the nurse then to put her hand behind the knee as it lies in bed, and gently lift the knee, thus producing a slight amount of motion, which I believe is of decided advantage. This movement is systematically but cautiously increased until at the end of the sixth week we ought to have flexion almost to a right angle. The point is to do this gradually and systematically, and function will be completely restored in less than two months without breaking up the union.

This is contrary to the practice of Dr. Murphy. Believing that the sesamoid bones require "complete, prolonged, and rigid immobilization to secure perfect union," he kept these cases thus immobilized for not less than eight weeks (Clinic, August, 1915, p. 774), and insisted upon this, but my experience has been that the stiffness after such prolonged fixation is overcome with great difficulty. In the late war the principle of early mobilization of the knee in the treatment of fractures of the femur was demonstrated to be correct, and the results of the later years of the war were far better than in the beginning when so much disability from stiff knees was observed as a result of immobilization in extension.

By this simple technic carried out in this case you may expect excellent functional results, and in the majority of cases bony union. A useful addition is that carried out by Dr. Murphy (see clinics referred to) consisting in the passing of two phosphor-bronze flexible wire (Hyrtle's Vienna wire) loops about the patella, passing through the quadriceps tendon above and the patella tendon below, hugging the patella closely, one loop being tied on the outer side, the other on the inner side. A useful modification is that devised by Dr. E. D. Martin, my colleague. He uses annealed iron wire (ordinary stove wire), and passes the loop very similarly to that of Murphy, twisting the wire in front of the patella. I believe, as he asserts, that this assists in maintaining contact of the fragments, permits of earlier active motion, and makes bony union more certain. He has found the presence of the wire unobjectionable in any way.

The results in all these cases treated by simple suture of the soft parts have been uniformly good except in one case,

where two months after the operation the patient suffered a second fracture, due to a violent wrench while trying to push a stalled automobile on a wet asphalt pavement. I reopened the knee, which was considerably swollen, about two hours after the accident, and resutured in the same way. The result has been quite satisfactory. An interesting observation made at this last operation is that the bony surfaces exposed were fresh, as if they had been united and violently torn apart. There was no organized tissue covering them, as would have been the case if they had not in the period intervening between the first and second operation been in close contact. An *x*-Ray taken April 9, 1922 showed bony union.

Note.—The patient left the hospital May 18th, with gradually improving function of the knee. I have been unable to find her, but I have every reason to believe she will have practically a normal knee.

CLINIC OF DR. IRVIN ABELL

ST. JOSEPH'S INFIRMARY, LOUISVILLE, KY.

GASTRIC ULCER

THE patient, a white male, aged twenty-three, gives as his chief complaint "stomach trouble." He is one of 13 children, of whom 5 died in infancy, the remainder being alive and well. His personal history is negative until the inception of the present complaint one year ago. He first noted discomfort in upper abdomen accompanied with sour eructations coming on about one hour after eating. In the beginning there were intervals of freedom from such discomfort during which he was able to partake of an ordinary diet; later, distress was constant. For the past two months he has had soreness through upper abdomen not influenced by food; during the same period he has been subject to daily vomiting spells except for one three-week period when taking medicine from his home physician. He has never noted blood in the vomitus, the latter consisting of mucus, ingested food, and drink. For the past week he has had tarry stools. He thinks he has lost but little if any weight. The points in his history that are of interest are sour stomach, pain after eating, vomiting, soreness in the epigastrium, and the passage of tarry stools, a history rather typical of peptic ulcer, needing but two more symptoms—hematemesis and food ease—to make it classic.

Physical examination is negative except for extreme tenderness in epigastrium and a loud pleuritic rub over whole right chest, most marked at base; roughened breath sounds over right upper anterior chest with occasional sharp moist râle. *x*-Ray of chest shows slight thickening of pleuræ of both sides, with lungs negative. Blood count shows normal number of cells, red blood-cells 4,750,000, white cells 8100, with a hemo-

globin of 80. The urine shows a high acidity, 140, with a faint trace of albumin, a trace of acetone, and a few hyaline casts. Fluoroscopic examination of stomach showed marked pylorospasm; reraying after belladonna revealed pylorospasm still present with a definite incisura on greater curvature of prepyloric region and a niche of lesser curvature of pars pylorica. Duodenum is negative.

The clinical history and the *x*-ray findings permit of a positive diagnosis of gastric ulcer. The presence of symptoms for one year, which have been progressive in their intensity, the constant pain for the past two months, the presence of almost daily vomiting during this latter period, indicate not only the desirability, but the necessity for surgical measures in preference to medical.

The stomach is exposed through an upper right paramedian incision; the lesser curvature near the pylorus presents marked induration, while the crater of the ulcer, admitting the tip of the index-finger, can be felt on the posterior wall about 1 inch from the pylorus. Upon opening the gastrohepatic omentum the pancreas is firmly adherent to stomach at site of ulcer; separating this adhesion, the ulcer proves to be of the perforative type, all coats of the stomach having been destroyed, diameter of the defect being approximately 1 inch. The glands along both greater and lesser curvature are palpably enlarged, evidently the result of a toxic lymphnoditis.

Experience, and some of it has been bitter, has taught us that any surgical treatment of gastric ulcer which does not remove the ulcer is unsatisfactory. Simple gastro-enterostomy may give symptomatic relief, which may or may not be permanent; surely it does not always result in the healing of the ulcer, in which event symptoms continue or else recur, nor does it give protection against the development of carcinoma in the ulcer area. I have met with both embarrassments, and as a result have adopted the practice of destroying the ulcer with the cautery as suggested by Balfour, or by resecting the ulcer or of removing it by gastric resection, the type of operation depending upon the site of the ulcer and the amount of the

accompanying induration. In this instance the proximity of the ulcer to the pylorus and the extent of the surrounding induration make it impractical to do other than a resection of the pylorus. This is done in the usual manner, first tying off the gastrohepatic and greater omenta; the duodenum is then crushed, cut through with cautery, and closed with catgut and linen. The stomach above point of ulcer is treated in like manner, after which a posterior gastro-enterostomy is made. The gall-bladder is negative and the appendix, though negative in appearance, is removed. A small cigarette drain is carried down to pancreas to site of ulcer adhesion and brought out through stab wound to right of incision, and the latter closed.

The cause of gastric ulcer remains obscure; Rosenow's studies on the selective affinity of bacteria prove that blood-borne infection (organisms) can and does produce typical gastric ulcers in laboratory animals. Such a hypothesis offers a logical explanation for their occurrence in man, confirmatory evidence being found in the frequent association of gall-bladder and appendix infections.

Correlation of the history analysis with the *x*-ray findings will give a positive diagnosis in 95 per cent. of cases. Discussion as to the relative merits of medical and surgical treatment is voluminous with certain cases, such as those presenting persistent and uncontrollable pain, vomiting, and bleeding; those with pyloric obstruction due to deformity of stomach wall, as well as acute and chronic perforations, being accorded by all to the domain of surgery. For the cases presenting less urgent symptoms, treated by diet and alkalinization over a long period of time, a large proportion of cures is claimed by the internist. Some ulcers, from a clinical standpoint, begin insidiously, some acutely, and many, in their course, show periods of quiescence; our inability to determine the exact pathologic status of every ulcer by any means short of exposure must be admitted, and hence our inability to agree on treatment. The first acute perforation upon which I ever operated occurred in a man twenty years of age, who maintained that he never had a symptom until the night his ulcer perforated, and in the

patient just operated on we find in a man of twenty-three, whose symptoms had existed one year, a large, indurated, undermined, perforated ulcer ordinarily observed in patients much older and associated with a much longer duration of symptoms. In no grave disease do we obtain 100 per cent. of cures by any method of treatment, and as desirable as this might be, its hopelessness in the gastric ulcer is apparent. The elucidation of its unsettled problems and the comfort and safety of the patient can best be attained by the joint work of the internist and surgeon.

Microscopic examination: Subacute, undermining ulcer—no evidence of malignancy. Healed appendix.

Recovery note: Convalescence complicated by an acute bronchitis, bilateral. Discharged from hospital as well on the seventeenth day.

ADENOMYOMA OF UTERUS

THE patient is a married woman forty-two years of age, the mother of 3 children; the first pregnancy was complicated by placenta prævia, resulting in loss of child; the second child died shortly after birth, cause unknown; the third child is living and well. Her father is dead of cancer, 1 brother dead of tumor of brain, mother, 1 sister, and 2 brothers living and well. She first came under observation in March, 1921, with toxic adenomata of the thyroid. She gave a history of thyroid enlargement which had existed since puberty, of its increase in size after the age of thirty, and of the presence of toxic symptoms for two years. At that time the pulse varied from 120 to 140; blood-pressure 174/88; heart regular, no murmurs, apex ½ inch to left of nipple line. She presented a marked tremor, with no eye symptoms and no edema. A bilobular resection has resulted in complete relief of toxic symptoms. She returns now on account of pelvic discomfort with painful periods and excessive flow. Pelvic discomfort consists of bearing-down pain, noted chiefly when on feet and greatly accentuated at menses. Periods are regular, twenty-eight-day cycle and five-day duration, flow very free. In past year they have become quite painful, confining patient to bed for one to two days each month. There is slight leukorrhea and occasional frequency of urination. General health is good.

Examination of the neck shows no palpable mass or irregularity at site of thyroid resection; the pulse is slow, but apex-beat is displaced to left; there are no murmurs.

Pelvis shows left-sided tear of cervix extending up to uterine body. Uterus shows the presence of slightly nodular tumor with most marked development from posterior wall, the entire mass approximating the size of an eight to ten weeks pregnancy. The tumor is low in the pelvis, more or less firmly fixed, and is

tender to pressure. The rectum is negative for hemorrhoids and shows the encroachment of the growth upon the lumen of the bowel, to the wall of which it is seemingly adherent.

The age of the patient, history of onset, increased menstrual flow with absence of intermenstrual bleeding, and the presence of a slightly nodular tumor growing from the uterine body warrant a diagnosis of fibromyomata of uterus. The commonly observed disturbance of function, hemorrhage, has not been a marked feature, the flow has been free, but not profuse; the blood count shows but little change.

The tumor is exposed by a low median incision; it is found to involve the entire uterine body, showing most marked development from posterior wall; at this point it pretty nearly fills the pelvis and has adhered to it the lower sigmoid and upper rectum. These adhesions are quite dense and are separated with difficulty; as the dissection is carried deeper, lines of cleavage seem to be lost and the utmost care is required to avoid opening the bowel, the muscular coat of which has been entered at several points. The uncovered posterior surface of growth shows the presence of multiple small cysts which are bluish-black in color; none of these appear on the anterior surface. From these it is evident that in the provisional diagnosis an error has been made as regards the character of the tumor, it being an adenomyoma rather than a fibromyoma. The neoplastic disease extends into the upper portion of posterior wall of cervix; this involvement and the presence of an unusually deep tear with hardened, everted edges make its complete removal advisable. The right tube and ovary are negative and are not disturbed; the left tube and ovary were embedded between sigmoid and tumor, and in their enucleation have been denuded of peritoneal covering, and are removed with the tumor—transvaginal section. The pelvic toilet is completed by anchoring the round and uterosacral ligaments to the closed vagina and covering with peritoneum. Appendix is thick walled, club shaped, and is removed. Gall-bladder shows the presence of omental adhesions, contains no stones, and is not disturbed. Abdomen is closed.

The pathologic picture presented by adenomyomata of the uterus is that of non-striated muscle-fiber tumor into which the uterine mucosa has projected itself at various points. The neoplasm is not circumscribed as are fibromyomata, but is directly continuous with the uterine tissue, from which it is most difficult or impossible to separate. The uterine mucosa projecting into the myoma becomes shut off at points distant from the uterine cavity, giving rise to cyst formation, the contents being menstrual blood, which has no means of exit. The swelling in the adventitious mucosa at the menstrual period accounts both for the increased flow and for the severe pain experienced at that time. The uterine mucosa remains practically normal, hence there is no intermenstrual bleeding or discharge. I have observed them in the uterus and once each in the fallopian tube and the round ligament, although their distribution in the female genital tract is rather wide-spread. Cullen, whose study of this subject has been wide, states that he has found uterine mucosa in ten places, namely, adenomyoma of the body of the uterus, of the rectovaginal septum, of the uterine horn or of the fallopian tube, of the round ligament, of the utero-ovarian ligament, of the uterosacral ligament, of the sigmoid flexure, of the rectus muscle, of the umbilicus, and uterine mucosa in the ovary. The discomfort and pain with disturbance of function to which they give rise clearly indicate the advisability of the removal. This at times, as in the present instance, proves a difficult procedure.

Recovery note: Patient discharged from the hospital as well on the eighteenth day.

Microscopic examination: Adenomyoma of uterus.

CARCINOMA OF BREAST

THE patient is a married woman, forty-seven years of age. The family history is negative. She has never been pregnant and she passed the menopause at forty-three. She presents herself for treatment because of an enlargement in the left breast which she first noted six months ago. She attributes this to an injury of the breast sustained in a fall four years ago.

I have had 17 patients with breast tumors who have given a positive history of injury. While it is conceivable that in the process of repair lawless cell growth might induce neoplastic disease, I have always felt in the vast majority of cases the more probable explanation lies in coincidence or else in the injury, serving to attract the patient's attention to an already present defect.

Since the appearance of the growth in this patient, three and a half years after reception of injury, it has evinced progressive increase in size, and in the last six weeks has given rise to slight pain. Her general health is good and she has lost no weight.

The blood and urine are normal and the physical examination is negative with the exception of the left breast; the patient is moderately obese and the breasts are large; in the center of the upper half of the left one is a tumor, hard, not tender to touch, immovable, not circumscribed, and has an approximate diameter of 1¼ inches. The overlying skin is slightly but definitely adhered; rotation of the breast on chest produces a distinct dimpling of skin at site of adhesion. This symptom is ordinarily produced by one of two conditions—carcinoma and inflammation; the latter can be excluded in this patient. The nipple is not retracted and the axillary glands are not palpable. It is the practice in this clinic to make rush microscopic diagnoses on all breast tumors that are of doubtful character; an incision

is made along the border of the gland, the latter lifted from pectoral muscle, and the tumor, with an appreciable area of surrounding breast tissue, removed. This is sent to the pathologic laboratory, and while frozen tissue examination is being made the wound is closed. If when the report is returned the tumor proves benign, the operation is complete; if it proves malignant, gloves, instruments, and draperies are changed, field of operation repainted, and a radical breast amputation is done. In a series of 57 consecutive breast tumors examined in this manner the diagnosis has been confirmed by subsequent multiple embedded sections, there being in the 57 cases but two modifications of the diagnosis, in 1 chronic mastitis was added to adenoma and in 1 sarcoma was added to fibro-adenoma.

The diagnosis is made here without the aid of the microscope, and the radical amputation will be carried out after the method suggested by Rodman. The first incision is 1 inch below and parallels the axillary fold beginning at the clavicle and ending at the border of the latissimus dorsi; through this the tendons of both pectoral muscles are divided at their insertion, the axillary fat, fascia, and glands dissected from the brachial plexus and axillary vessels, dividing between ligatures those branches of axillary artery, with their accompanying veins, which supply breast and muscles. A second incision beginning over border of pectoralis major tendon passes internally to breast extending to point below costal border over sheath of rectus muscle. A third incision starts near posterior axillary border, passes along outer margin of breast, and joins termination of second one below costal arch; the skin edges are undermined and reflected and the breast, with overlying skin, attached muscles, axillary glands, fat, and fascia, removed *en masse* from above downward, all bleeding points are ligated, and the wound closed with rubber tissue drainage of axillary space.

Upon gross examination of breast cut surface shows hard, pale gray nodule, 1½ inches in diameter, not encapsulated. Two slightly enlarged firm lymph-nodes are found in the axillary fat. Routine microscopic examination of palpably enlarged axillary glands found in connection with carcinoma of the

breast in this clinic has revealed that in one-third of the cases the enlargement is due to metastases and in two-thirds it is due to toxic lymphnoditis. Only in those cases in which upon palpation the glands are found matted together or else are hard and shotty can one feel confident that the microscope will reveal metastases. The surgical treatment of carcinoma of the breast has reached its acme of development; it does not seem possible to do a more radical or thorough operation than the one in common use. Any further improvement in the ultimate mortality must come as a result of earlier recognition with consequent earlier operation; and this can be brought about only by education of lay people. This patient, after knowing that she had an enlargement in her breast, waited six months before consulting a physician; surely an operation at that time would have given her a better chance for cure than the one done this morning. The American Society for the Prevention and Control of Cancer hopes to reduce the mortality from this disease 30 per cent. in the next decade by means of education of lay people as to the significance of the early signs of cancer and of the conditions in which or following which cancer so frequently develops; this hope in regard to cancer of the breast is not an unduly high one, since in this organ it is accessible, permits of early recognition, and is susceptible of radical ablation.

Recovery note: Discharged from the hospital as well on the fourteenth day after operation.

Microscopic examination: Adenocarcinoma of breast; axillary glands negative for metastases.

MULTIPLE ADENOMATA OF THYROID, TOXIC, SUBSTERNAL

THE patient is a married woman, fifty-seven years of age, the mother of 4 children, the oldest of which is twenty-two, the youngest twelve. The menopause began at fifty-four and was complete at fifty-six. The family history is negative, and with the exception of influenza and pneumonia in 1918 the personal history is negative other than for goiter, which she first noted after childbirth twenty years ago. She gave but scant attention to this, as the only subjective symptom was the presence of an enlargement. As the years went by this gradually increased in size, and in the last five years she has noted an increasing shortness of breath on exertion; at times she experiences a choking sensation, which on physical effort, especially on going up stairs, becomes acute. At present she is quite nervous; appetite is good and there is no weight loss; sleeps well, but uses three pillows; notes profuse perspiration on exertion and swelling of ankles toward end of the day, the latter disappearing during sleep; has been able to do her own housework.

She is a large woman, 71 inches in height, and weighs 225 pounds. When she entered the hospital ten days ago she had a pulse-rate of 110, with many extrasystoles; blood-pressure 196/84: the apex-beat of the heart was at the anterior axillary line and a loud, systolic bruit could be heard at apex, which was transmitted to axilla; the second sound at aortic area was accentuated. Both lungs showed the presence of scattered dry râles. The abdomen was very large and showed a diastasis of the recti. Slight edema of the lower extremities was present. The thyroid showed a large multiple adenomatous condition of the right lobe, measuring about 5 by 5 by 3 inches, pushing trachea and larynx far to the left side; the condition of the

left lobe could not be determined because of the great size of the right, which filled the neck. When at rest breathing was not disturbed, but on exertion it became labored and somewhat noisy. It was impossible to definitely locate the trachea at the chest aperture, the intensity of the tracheal breath sounds as determined with the stethoscope being equal at all points of circumference of neck. Laryngoscopic examination: Perfect phonation showed good abduction. On deep inspiration cords partially separated, hesitated, and then abducted fully, indicating disturbance of function due to pressure on recurrent laryngeal nerve. Both blood and urine were normal. Determination of basal metabolic rate was hampered by difficult breathing, and the reading obtained, plus 27, may not be accurate.

The problems presented by this case are threefold: first, the size of the goiter and its toxicity; second, the evident pressure both on trachea and recurrent laryngeal; third, the presence of myocardial degeneration, mitral regurgitation, and cardiac hypertrophy associated with hypertension. The preliminary treatment has consisted of absolute rest and digitalization, the latter accomplished by the administration of 400 minims of tincture of digitalis over a period of four days. The edema of the legs has disappeared, the pulse-rate is 80 with no extrasystoles, and the systolic pressure is 170. In these desperate risk cases local anesthesia is far safer than general, and an effort will be made to carry out the entire operation under novocain, supplementing it if necessary with nitrous-oxid-oxygen analgesia.

She has had one hour ago a preliminary injection of $\frac{1}{4}$ grain morphin and $\frac{1}{200}$ grain atropin. The line of incision and the subcutaneous tissues of the entire operative field, including those below the platysma, are infiltrated with 1 per cent. novocain solution. Collar incision is made and the flap is anchored up out of the way. The ribbon muscles of both sides are infiltrated with novocain, separated in the midline, and those of the right side divided between muscle clamps. This large mass which is exposed and delivered represents the neoplastic growth from the right lobe; clamps are applied to the superior artery and to capsule along the outer border and inferior pole

of tumor, keeping sufficiently far forward to avoid the nerve. It is a comfort to be able to operate on a case of this kind under local anesthesia, as the patient's voice in responding to questions will indicate any disturbance of nerve. The mass is cut away and the tissue in all clamps is ligated before the clamps are removed. The difficulty in determining the condition of the left lobe is now readily explained; the growth is quite large and extends down into thorax to the side of and behind the trachea, pushing the latter forward and to the right until it impinges on the first rib at a point behind the right sterno-clavicular articulation. The superior vessels are ligated and divided, a line of cleavage around this mass followed into the thorax as far as the finger will reach, and an effort made to deliver it by traction with volsellum forceps; the resistance is such that the volsella morcellate the tissue within their grasp. The upper pole of the tumor is caught with artery forceps and the exposed portion of the tumor grasped with the gloved hand covered with gauze to prevent slipping; using gentle traction combined with a rocking motion the mass is delivered and proves to be almost as large as that removed from the right lobe, it being 5 by 5 by 3 inches, and this, the intrathoracic one, being 5 by 3 by 1½ inches. Fortunately, there is but little bleeding and this is readily controlled by ligature. Two small rubber tissue drains are inserted, one in the intrathoracic space and one in the neck, both being brought out center of incision, and the wound closed. The ribbon muscles of the left side were not divided; if the ribbon muscles are divided over the most prominent side of the goiter no difficulty will be experienced, after removing the prominent lobe, in dislocating the remaining one into easy access. It has not been necessary to use gas, the patient's voice is unchanged, and her pulse has remained under 90 throughout.

This case represents an exaggerated type of a rather frequently observed sequence of events: the appearance of an adenoma in the thyroid, its tolerance on the part of the patient since it gives rise to no symptoms other than the presence of the enlargement, its gradual growth, chance determining the direc-

tion of same into neck, retrotracheal or intrathoracic, and finally, as the patient approaches middle life, the development of toxicity with consequent myocardial degeneration. It is far better to remove them as soon as they appear, since no other treatment is of value, and their absence gives assurance against myocardial and other damage.

Recovery note: Discharged from the hospital on the twelfth day.

Microscopic report: Adenoma; follicular hyperplasia and distention; hemorrhage and retrograde changes.

ABDOMINAL PREGNANCY

PATIENT is a married woman, thirty-six years of age. Family history is negative, she being one of 7 children, all well and healthy. Menses began at fifteen and, except when pregnant, have been regular, painless, twenty-eight-day cycle and four-day duration. She was married at age of twenty-five and has one child, ten years of age, living and well. Since the birth of this child she has had a moderate leukorrhea. There have been no miscarriages. Nine and a half months ago period began at normal time, but flow continued for six weeks, during which time a certain amount of pelvic discomfort was noted. There has been no recurrence of the period until twelve days ago. Shortly after cessation of flow pigmentation of the areola was noted, as was morning nausea. Four months after onset of last menses she noticed fetal movements, which continued daily until one month ago, since when none have been felt. During the nine and a half months she has had cramping pains in the left lower quadrant of abdomen at irregular intervals, at times of such severity as to confine her to bed for one or two days. One month ago pains were noted which she attributed to onset of labor; they were weak and occurred at long intervals, stopping entirely at end of twenty-four hours. It was during this period that she felt fetal movements for the last time. Twelve days ago the pains recurred, accompanied by a bloody flow, both of which have since been constantly present.

The urine shows a faint trace of albumin; otherwise negative. The blood shows: hemoglobin, 84; red blood-cells, 4,750,000; white cells, 11,600; polynuclear neutrophils, 70.1; small lymphocytes, 26.2; large lymphocytes, 3.7. Heart and lungs are negative. Blood-pressure 108/86. Abdomen is distended by a mass which reaches from the symphysis to within 2 inches of the xyphoid cartilage; it is irregular in contour, being greater

on left side than on right; the right iliac fossa shows a much smaller, rounded, slightly movable mass. The cervix is large, soft and patulous, admitting index-finger. I am unable to distinguish the uterus, the pelvis being filled by lower pole of abdominal mass. Grasping the cervix with a volsellum and pulling it down I am able to insert my finger into the uterine cavity, finding it empty; at the same time I am able to demonstrate that the mass in right iliac fossa is the body of the uterus, approximately the size of a ten weeks pregnancy. The patient evidently has an abdominal pregnancy, at or near full term, with a dead fetus.

Midline incision extending from symphysis to point 2 inches above umbilicus. The uterus is about the size of a ten weeks pregnancy and is pushed well up and to the right of the midline; the gestation sac is attached to the posterior surface of uterus and broad ligaments, fills the pelvis and lower abdomen, being tightly incorporated with mesentery of sigmoid, descending and transverse colon. At point above the uterus, in midline and to right of same, sac is free of adhesions, presenting a network of large venous channels; these are ligated, the sac opened, and the child extracted. There is practically no amniotic fluid. There is placental tissue at all edges of the incision in sac with the cord attached posteriorly at a point corresponding with sacro-iliac articulation. Placenta is thinner and has a much wider distribution than in an intra-uterine pregnancy; notwithstanding the death of the child some time ago it does not separate readily and bleeds freely, and although recognizing the desirability of its removal, it is thought best in this instance to allow it to remain, suturing the sac to the parietal peritoneum and draining same with a light gauze pack, after which the abdomen is closed. The child is a well-formed female weighing $6\frac{1}{2}$ pounds, and the degree of maceration of skin would indicate that death had occurred from three to five weeks ago. This time would correspond to the onset of spurious labor four weeks ago as given in her history.

Ectopic pregnancies that go to full term are situated in the broad ligament, in the abdomen, or, as in this instance, partly

in the broad ligament and partly in the abdomen, fecundation having occurred in the tube with rupture into the broad ligament and, at a later stage of development, partial rupture into the abdomen. The method of dealing with the sac and placenta in advanced ectopic pregnancy presents problems which must be solved according to conditions that exist at time of operation; the desirability of removing the sac and placenta is apparent, its feasibility and safety not always obvious. When the pregnancy products are contained entirely in the broad ligament it will be usually possible to remove the placenta, controlling the greater portion of its blood-supply by ligation of the ovarian artery at the brim of the pelvis and the uterine cornu of the side from which the pregnancy originated. I was able to do this in one such case coming under my care, the pregnancy being intraligamentous and full term with a dead fetus. The bleeding while free was readily controlled by ligation of the ovarian supplemented by a light gauze pack, and the removal of the placenta greatly hastened recovery in that it greatly reduced the amount of tissue to be exfoliated. When the formation of the sac and attachment of placenta are such as to render this course inadvisable, two courses of action are open: one consists in closing the abdomen, leaving to nature the removal of the placenta by phagocytic attack, based on the observation that in unoperated cases of advanced ectopic gestation the removal of all pregnancy products except the fetal skeleton is so accomplished. Where this course is adopted one must be prepared to reopen wound promptly in case of hemorrhage or infection. The second course is the one adopted in this case, suturing the sac to the abdominal wall and providing adequate drainage for the débris and discharge resulting from disintegration of placenta and amniotic sac. Many cases of advanced ectopic gestation are on record in which living children have been delivered at operation. It is a noteworthy fact that a large percentage of these are physically unfit for survival, about 50 per cent. of them dying within the first week. The mortality in the remaining 50 per cent. is rather high during the first year of life, with an appreciable number attaining full growth.

Recovery note: Free discharge from drainage tract with fever ranging from 101° to 102° F. during first twenty days, after which she was free of fever and drainage decreased. Patient discharged from hospital on twenty-fifth day after operation.

COMPLETE LACERATION OF PERINEUM; RETROVERSION AND SUBINVOLUTION OF UTERUS; TRANSPOSITION OF VISCERA

THE patient is a married woman thirty-one years of age. She has been married twelve years and is the mother of 5 children, the oldest of which is ten years of age, the youngest two years. She sustained a complete laceration of the perineum at the first delivery, an unsuccessful effort at repair being made at the time. Her personal history is negative except for pelvic discomfort, varicose veins, and incomplete control of bowel. Her menses are normal, she has at times a profuse leukorrhea, and notes when on feet a sensation of weight and pressure in the pelvis. Sphincter control is ineffective for gas and feces unless the latter are formed. Ankles and legs below knees occasionally show swelling. She is easily fatigued and unable to attend to her household duties. Her lungs are negative, heart is negative for murmurs with apex internal to right nipple line, cardia dextra, rate 110, blood-pressure 100/65. Abdominal wall is loose and lax, presenting the characteristics of a maternal ptosis. The perineum shows a complete laceration; the uterus is large, retroverted, movable, the cervix presenting a deep bilateral laceration. The left leg shows the presence of varicose veins from knee to ankle, no edema. The urine is negative, while the blood shows a rather marked anemia, hemoglobin 78, R. B. C. 3,435,000, W. C. 11,750, with a normal differential count. The uterus is cureted and the cervical lacerations repaired by paring away the scar tissue and closing with extra hard chromic gut. The vascularity of the cervix is such that gut of ordinary resistance is quickly absorbed, resulting at times in secondary hemorrhage, necessitating resuturing. After meeting with this experience in several patients I have been able to obviate its recurrence by the use of the extra hard gut.

The perineum is repaired by dissecting out the ends of the ruptured sphincter and the separated levator ani muscles, suturing these with interrupted sutures of catgut, and covering same with mucosa and skin. Two stay sutures of fine silkworm-gut are placed in the sphincter, early experience with separation of sutured sphincter at end of seven or eight days having convinced me of the wisdom of such a course. These are not removed until the eleventh or twelfth day. The abdomen is opened by a low median incision; the uterus is large, subinvoluted, and retroverted; the ovaries and right tube are negative, the left one shows venous congestion with distention of its outer third. Tube is resected and uterus suspended by bringing round ligaments through internal rings and suturing to under surface of fascia abdominalis; this is accomplished by passing a curved forceps outward from the midline incision, between the rectus and fascia, entering the peritoneal cavity at the internal ring, grasping the round ligament midway between ring and uterus, and drawing it up to its point of anchorage, where it is fastened with interrupted catgut sutures, care being taken that the blood-supply of the ligament is not occluded. In looking for the appendix the sigmoid and descending colon are found on the right, the cecum, ascending colon, and appendix on the left side of abdomen. Appendix shows chronic inflammatory change and is removed. Further examination of abdomen shows the liver, gall-bladder, and pylorus in left hypochondrium, the cardiac end of stomach and spleen in right hypochondrium. Kidneys are normal in size and position. Abdomen closed.

The pelvic findings in this case are quite common and demonstrate that the old, old lesson regarding the prompt and accurate repair of obstetric lacerations is still disregarded to the discomfort of the patient and the discomfiture of the accoucheur. Poor Richard's saying that a stitch in time saves nine is surely apropos in this class of injuries.

The transposition of the viscera is not common and might conceivably lead to error in diagnosis, as it did in the only other instance of like character coming under my observation. The patient, a woman, came on account of a myomatous uterus

with profuse blood loss. In her history she stated that she had had three attacks of acute pain in left lower quadrant associated with nausea and vomiting. Pelvic examination revealed the myomatous growth with marked tenderness in left tubal region; this was interpreted as a salpingitis, and at operation transposition of the viscera was found, the pathology in and about the appendix shedding abundant light on the cause of her attacks of colic. Transposition of the viscera is one of the three factors determining the location of the appendix, the other two being the length and mobility of the mesocolon and the lack or arrest of rotation of colon in embryonic life.

Recovery note: Convalescence complicated by right femoral thrombophlebitis, patient being discharged on the forty-fifth day.

Postoperative femoral thrombophlebitis is left sided in over 90 per cent. of cases; considering the transposition in this case, the right femoral thrombophlebitis may be regarded as following the usually observed course.

CLINIC OF J. M. MASON

HILLMAN HOSPITAL, BIRMINGHAM, ALABAMA

THROMBOSIS OF SUPERIOR MESENTERIC VESSELS, WITH SUCCESSFUL RESECTION OF 65 INCHES OF INFARCTED ILEUM

RECENT literature has contained so many reports of this appalling condition, with such high mortality, that the following case may prove interesting both as to the apparent cause of the thrombosis and the fortunate outcome of resection.

Mrs. D., white, aged thirty-five, was admitted to the Hillman Hospital, May 18, 1921, at 3.30 P. M. A diagnosis of intestinal obstruction had been made by the physician who saw her before admission, and the diagnosis was concurred in. She gave the following history:

On July 31, 1920 she had undergone a pelvic operation, at which time her appendix and right tube and ovary had been removed and the uterus suspended. She had remained in good health except for a sense of fulness in abdomen after meals. For two weeks past the discomfort had been worse. On the morning of May 17th there was a small bowel movement. All the afternoon she felt very uncomfortable in the abdomen, and about 9 P. M. was seized with sudden, severe abdominal pains.

She took purgatives and enemas without result, and grew rapidly worse. The next morning a physician was called, and she was admitted to the Hillman Hospital at 3.30 P. M., where I saw her at 4.40 P. M., in consultation with Dr. E. P. Hogan, Superintendent of the Hospital.

Examination.—Pulse rapid and weak; heart sounds faint, but no valvular lesions detected; lungs clear. Abdomen very

much distended, with tenderness over lower half. Patient was nauseated, and complained of severe griping pains. An old laparotomy scar was present in the midline below the umbilicus. Vaginal examination showed relaxation of perineum, slight laceration of cervix, fundus uteri in anterior position, no adnexal masses.

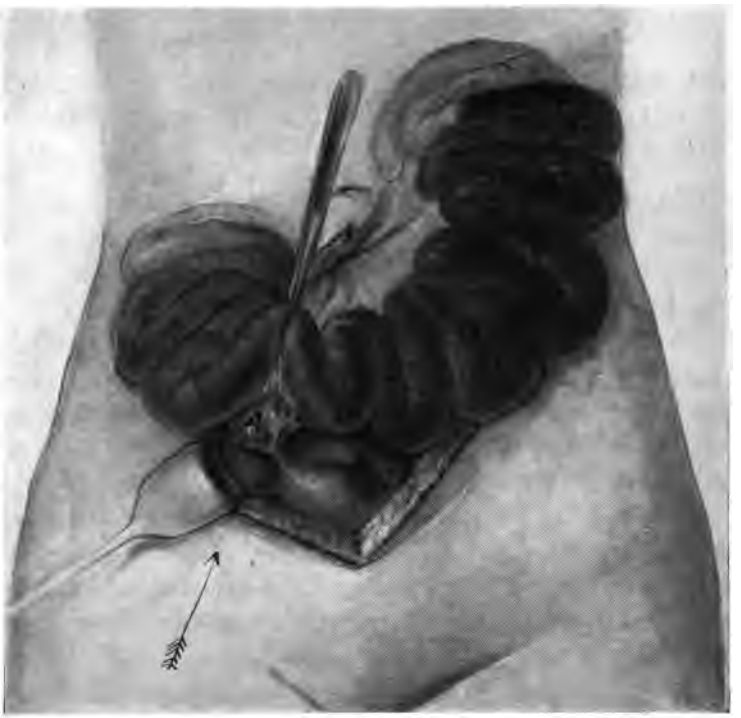

Fig. 502.—*A*, Adhesion, above which may be noted the coils of infarcted ileum, with clear-cut line of demarcation.

Patient has large varicose veins in left thigh, extending to vulva, but phlebitis is not present.

Operation was immediately undertaken, twenty hours after the onset of the severe pain.

Upon opening the abdomen foul-smelling, bloody fluid escaped and dark colored intestinal coils were at once en-

countered. On passing the hand into the pelvis, adhesions were detected, and, upon inspection, it was found that a band 2½ inches broad by 1 inch long extended from the stump of the right broad ligament to the under surface of the mesentery, and was attached close up to the intestinal border. The condition is well illustrated in Fig. 502. The band was divided.

The lumen of the intestine was not encroached on, and there was no intestinal obstruction in a mechanical sense. The intestine was moderately distended, but no more so above the band than below it. At the site of the band and for several inches above and below it the intestine was very dusky in hue, with no distinct line of demarcation; higher up it became rapidly darker and entirely necrotic. The gangrenous intestine was traced upward to a clear-cut line of demarcation high up on the ileum.

The infarcted coils were brought out of the abdomen and resected, with immediate end-to-end anastomosis.

The resected segment measured 65 inches.

In the absence of other causes for thrombosis or embolism the influence of the adhesive band must be considered in the production of the hemorrhagic infarct. This could have acted in two ways: First, by interfering with the blood-supply in the terminal vessels of the ileum, thereby causing a lesion of the mucosa which was the beginning of a venous thrombosis which spread throughout a large area of the mesenteric veins; second, by so pulling on the root of the mesentery as to cause obstruction to the vessels, simulating a ligation, and bringing about a thrombosis in this manner.

Attention has been called to the fact that in embolism the symptoms appear suddenly, whereas in thrombosis they may be slower up to the time that complete thrombosis occurs, then the sudden severe pain manifests itself.

After this period the symptoms are the same whether the arterial or venous system is involved, and whether thrombosis or embolism has taken place.

My patient's symptoms in the afternoon and evening, previous to 9 P. M., were probably those of developing thrombosis,

which became complete when she had the severe pain at 9 o'clock. She left the hospital June 19, 1921 and has remained well.

In Surgery, Gynecology, and Obstetrics, October, 1921 Klein has a most exhaustive review of Embolism and Thrombosis of the Superior Mesenteric Artery. The first successful resection for infarction of the intestine from this cause was the case operated on by Elliott, of Boston, in 1895. Since then, according to Klein, 24 successful resections have been reported. While these are perhaps far short of the actual number of successful operative cases, they give one some idea of the seriousness of the condition and of its very high mortality.

CLINIC OF DR. MUIR BRADBURN

CHARITY HOSPITAL, NEW ORLEANS, LA.

FRACTURE OF FEMUR

R. M., AGED eighteen, was admitted to the hospital April 16, 1922. About midnight April 15th he was in an automobile accident; the machine was overturned, and he believes he was injured when one of the occupants fell on his thigh. On admission, the left femur was found fractured about the middle third, with 1½ inches shortening, and considerable posterior displacement of the lower fragment. April 16th, thirty-six hours after the accident, Edmonton tongs were inserted under local analgesia, just above the most prominent part of the femoral condyles, driving the points into the bone about ¼ inch. The patient was then suspended in a Thomas-Williams splint, having been placed previously on a special bed which we have devised, and which permits greater flexion of the knee than is possible with the ordinary bed. We applied 20 pounds traction immediately, and 5 pounds upward traction on the lower fragment to overcome the posterior displacement.

April 21st: *x*-Ray showed shortening overcome and posterior displacement improved; lateral displacement also present.

April 22d: Four pounds external traction applied to overcome lateral displacement, and upward traction increased to 10 pounds.

April 24th: Longitudinal traction reduced to 18 pounds.

April 25th: External traction removed and counterpressure pads used.

April 28th: Longitudinal traction reduced to 16 pounds.

May 2d: Upward traction reduced to 7 pounds. Longitudinal traction reduced to 14 pounds.

May 22d: Tongs removed; traction maintained by adhesive strips mainly for immobilization of thigh.

In fractures of the middle and lower thirds we continue upward traction after the posterior displacement has been cor-

Fig. 503.—Patient flexing knee.

rected in order to overcome the tendency of the gastrocnemius to reproduce the displacement, especially as the patient moves his

Fig. 504.—Patient extending knee.

knee *twice a day from the beginning* (Fig. 503). We prefer to have the patient give passive motion himself by means of a rope at-

tached to a flexion piece and moved through a pulley on the end of the immobile portion of the splint. To overcome too great exagger-

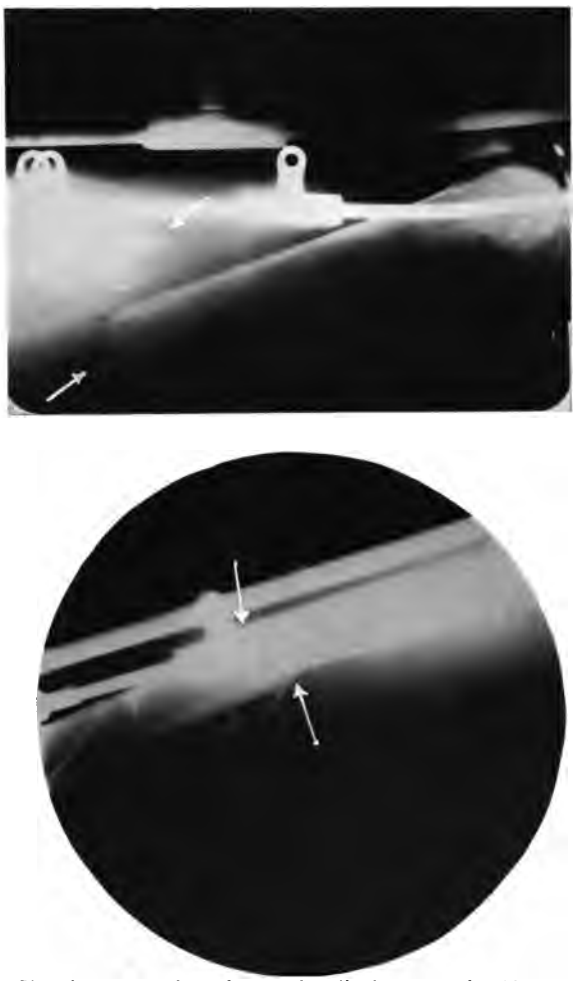

Fig. 505.—Showing correction of posterior displacement by 10 pounds upward traction.

ation of the anterior curvature of the femur in reducing posterior displacement we have devised a pad (shown in Fig. 507, *a*), which also prevents lifting of the limb from the splint when the patient

extends his leg. It is not difficult with skeletal traction to overcome shortening a couple of weeks after the fracture, but posterior

Fig. 506.—Showing correction of lateral displacement by use of counter-pressure pads.

and lateral displacements are not so easily overcome. We therefore start immediately to overcome these by upward traction and

the use of pads. If the lateral displacement is very marked, we prefer to use continuous rather than fixed lateral traction for a few days, and then substitute the counterpressure pads. In addition, we bring the lower fragment into the line of the upper.

In low fractures we use the weight of the leg (Fig. 503, *a*) in flexed position in addition to the upward traction to overcome

Fig. 507.—After reduction of fragments position is maintained by use of pads. Upward traction is continued to overcome action of gastrocnemius.

posterior displacement, discarding the foot-piece attached to the flexion attachment, and using the very satisfactory device of Dr. Blake for mobilizing the ankle and preventing foot-drop. However, after the first few weeks the regular foot-piece is reapplied, as the weight of the leg is likely to produce a deflection of the lower fragment after correction of the displacement.

It is now five weeks since the accident. This patient's limb is massaged daily, and in addition to passive, some active motion

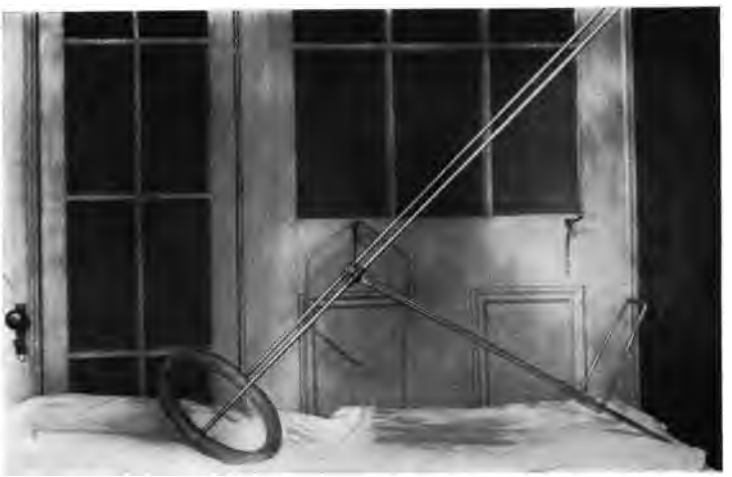

Fig. 508.—Thomas splint with Watkins-Williams flexion attachment.

is allowed, as the patient is instructed to contract the muscles when giving himself passive motion. So far we have alluded only

Fig. 509.—Showing flexion of knee at time of discharge from hospital two months after accident. Patient is able fully to extend leg.

to the mobility of the knee, as it is this joint with which we experience our greatest difficulty after fracture of the femur. The

other joints are also kept mobile; the patient moves the ankle frequently during the day, the hip is mobilized by changing the

Fig. 510.—Showing use of posterior pad to prevent sagging.

position of the back-rest, the patient sitting up during the day and lying down at night. All fractured femurs, by the way, are placed on air-rings from the beginning of the treatment.

Fig. 511.—Showing flexion of knee three and a half months after injury. Patient is able to extend leg fully. This patient was treated by traction and suspension in Thomas-Williams splint.

I would like to show you the great advantages of this flexion attachment to the Thomas splint, which was suggested by Dr.

Watkins Williams. This photograph (Fig. 511) shows the flexion of the knee obtained in our last case. The photograph was taken about three and a half months after the fracture; there was no shortening at the time of his discharge from the hospital.

We shall keep this young fellow suspended for three weeks longer, and then have a walking caliper made for him, and allow

Fig. 512.—Walking caliper.

him to get about on crutches. Dr. Pearson, in his excellent book on fractured femurs, suggests that the following measurements for the making of this caliper be given the splint maker:

1. Horizontal circumference of thigh just below tuber ischii.
2. Oblique circumference of thigh from tuber ischii at the inner side to midway between the crest of the ilium, and the tip of the great trochanter on the outer side.

The difference between these two measurements is usually from 2 to 2½ inches.

3. From tuber ischii to the sole of patient's heel.

This walking caliper he will wear for three months, after which he will use crutches for an additional month. We allow no weight bearing without the caliper for six months after a fracture of the femur. The routine treatment adopted by us in these fractures is as follows:

1. *x*-Ray examination.

2. Edmonton tongs. Thomas-Williams splint. Special bed for fractured femurs. Twenty pounds extension applied immediately. Corrective forces applied for posterior and lateral displacement.

3. *x*-Ray in five days. Readjustment if necessary. If deformity is overcome, secure position as shown in Fig. 507, *a*. All *x*-rays, of course, must be taken with portable machine, this being a *sine qua non* in the suspension method of treatment of fractures.

4. If shortening has been overcome, reduce traction to 15 pounds.

5. *x*-Ray again on fifteenth day if readjustments were necessary.

6. Case kept suspended for two months; tongs, however, frequently removed after four or five weeks and adhesive substituted.

7. Walking caliper for three months, removed several times daily in order to flex knee.

8. Crutches one month longer.

9. No weight bearing for six months.

The main sources of disability after fracture of the femur are shortening and impaired mobility of the knee. Skeletal traction is very effective, and so far it has not been my experience to fail in overcoming shortening. The flexion splint obviates immobile knees. As to the danger in the use of tongs, I would refer you to the article by Dr. Dennis W. Crile in the Amer. Med. Assoc. Jour., March 15, 1919, in which he makes this statement: "No case of sepsis has been seen in more than 300 cases which amounts

to more than slight local inflammation. The knee-joint has not been involved. Twice the anastomotica magna artery has been ruptured with the development of small aneurysms necessitating ligation of that artery."

About 10 per cent. of our cases treated by the above method have had pain from the use of the tongs. We have found this to be due to slipping of the tongs. The screw of the Edmonton tongs prevents approximation of the points, but does not prevent the burrowing of one point, with consequent liberation of the other point. To obviate this, we are having flanges placed on the tongs about $\frac{3}{8}$ inch from the points.

Note.—The patient was discharged from the hospital June 17th with no shortening, and with excellent mobility of the knee. Figure 509 shows the degree of knee flexion at the time of discharge.

While on the subject of fractures I should like to call to your attention 2 cases which have reported today. They illustrate our method of treating compound fractures, which consists in débridement, plating, and subsequent Carrel-Dakin method of treatment. The wounds in both cases have completely healed, with the plates still in place, and no sinuses leading down to them.

Case I.—W. B. Age twenty. While he was driving a tractor a cable caught his foot, and before he could stop the engine he heard the bones "snap," and, according to his statement, the leg was so bent that his foot was looking at him with the bones protruding through a wound on the external surface.

This patient was operated on within four hours after the accident for compound fracture of both bones. There was great laceration of muscle tissue. The lacerated muscle tissue was excised, and the free tendons, which have a tendency to slough with consequent infection, were also excised. All deep fascia, which likewise has a tendency to slough, which had been exposed by the tearing back of a large flap of skin, was also excised with the subcutaneous tissue. The tibia was plated, the periosteum being not disturbed, thereby not exposing the bone surface to infection. The wound was sutured and Carrel-Dakin tubes inserted. The

temperature reached normal on the fifth day, never having been above 100° F., and remained normal except for two days, when it was 99.2° F.

Case II.—A. G. Age fifty-five. Occupation, machinist. May 9, 1922 a revolving emery wheel broke and several frag-

Fig. 513.—Plating of compound fracture. Recovery, with plate *in situ*, with no sinus.

Fig. 514.—Compound fracture of humerus.

ments entered the arm, cutting a large, irregular gash in the lower outer third of the arm, fracturing the humerus. The bleeding was profuse. The patient was rushed to a local hospital, where bleeding was controlled, and he was then referred to us. From the location of the wound injury to the musculospiral nerve was suspected. Wrist-drop was present.

In this case the wound was washed thoroughly and the pieces

of emery wheel removed, the humerus was plated, the periosteum not being disturbed. The musculospiral nerve was sutured. The profuse bleeding was found to be due to an injury to the superior profunda artery, which started to bleed again during operation. In this case the wound made by the emery wheel was sufficient for all operative work. This case also received Carrel-Dakin treatment. His wounds are healed, with the plate still in place.

Fig. 515.—Plate applied to fracture shown in Fig. 514 Healing with plate *in situ*, with no sinus.

The function of the musculospiral has not yet returned, but in the meantime the hand is kept hyperextended, daily massage being given to the muscles. There was never any evidence of infection in this case. Only one bacterial wound count was made ten days after the accident, at which time the count was less than 1 to 5.

Note (June 21, 1922).—Patient first noticed ability to extend wrist.

PELVIC ABSCESS FOLLOWING SUPPURATIVE APPENDICITIS: DRAINAGE THROUGH RECTUM

THIS patient came to the hospital for pain in the right side of the abdomen. He was having frequent stools, but these were probably due to purgatives which he had taken. Onset was four days previous to admission. His greatest sensitiveness was low, probably 2 inches below McBurney's point. He had vomited a small amount of blood. His physician had difficulty in making a diagnosis.

He was operated on by one of the house surgical officers, and admitted to our service. The operative notes follow:

April 22, 1922: Diagnosis, appendical abscess. Operation, appendicectomy, drainage. Right rectus incision. The general peritoneal cavity was found completely walled off by a zone of exudate. The cecum was adherent to the right iliac fossa. On separating these adhesions a small quantity of pus was found and evacuated. The appendix was next sought for, and found distinctly adherent, gangrenous, and ruptured. After considerable difficulty it was liberated and removed with a cautery, and the stump inverted. Three cigarette drains, one through stab wound, others at upper and lower angle of wound.

Patient's temperature reached normal five days later, but subsequently he began to have fever. He began to refuse nourishment. The condition of the abdominal wound was excellent, and no mass could be felt by abdominal palpation. Examination yesterday by rectum showed a large mass which could not be palpated on abdominal examination. The patient states that every time an enema was given he had great pain on the insertion of the tube. This morning we shall evacuate the abscess through the rectum, under local analgesia, as suggested by Dr. Parham, Chief of the Service.

It is necessary first of all to relax the sphincter. We make a circumferential subcutaneous infiltration with ½ per cent.

novocain solution, with 4 drops of adrenalin to the ounce. We shall now make our four deep injections paralleling the anal canal. We feel the sphincter relaxing as we make these injections. We are now able to get a four-finger dilatation. We insert our speculum, and with the exploring syringe we aspirate this mass, which is very low. We have located the pus, and shall leave our needle in place as a guide, and make an incision into the cavity. Our knife is now in the cavity. Using it as a guide, we insert our Kocher forceps into the abscess. We dilate the opening. We have evacuated about a pint of pus. I am going to insert a cigarette drain to insure patency of the opening; this, of course, will be expelled with the first bowel movement.

Note.—The patient began eating the same day. His temperature reached normal the following day and remained so. He was out of bed in one week.

RIGHT POPLITEAL ANEURYSM

THIS patient, W. W., consulted me because of pain in the popliteal space which he had had for one year. On examination we find a pulsating tumor. It is about the size of a hen's egg, more easily palpated when the leg is flexed on the thigh, the long axis of the tumor in this flexed position being transverse.

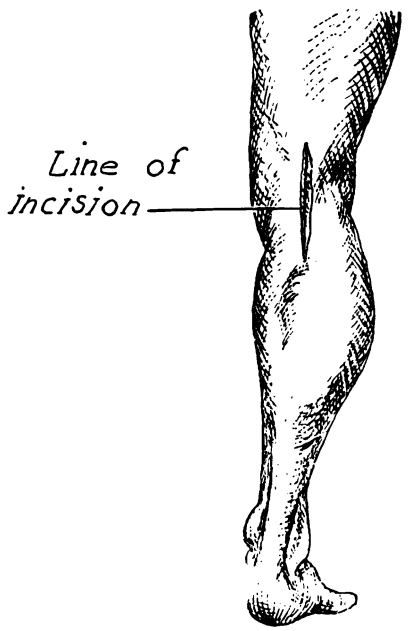

Fig. 516.

We find pulsation in both anterior and posterior tibials. The patient is a plasterer by occupation, and a note of interest in the previous history is the presence of a venereal sore twenty years ago and one four years ago. He states that he used to drink very heavily. As is frequent in this type of aneurysm, there is no history of trauma.

Dividing the popliteals into three groups—upper, middle, and lower—this is a middle popliteal aneurysm. We make an

Fig. 517.—Popliteal aneurysm, sacciform type. Upper large opening is the only communication with main artery. Lower opening is a collateral.

incision in the popliteal space in the long axis of the limb. We shall make our incision down to the sac before putting on the tourniquet. We now come on to the short saphenous vein,

which we shall retract, and go between the gastrocnemii. We come on to the popliteal vein and to the external popliteal

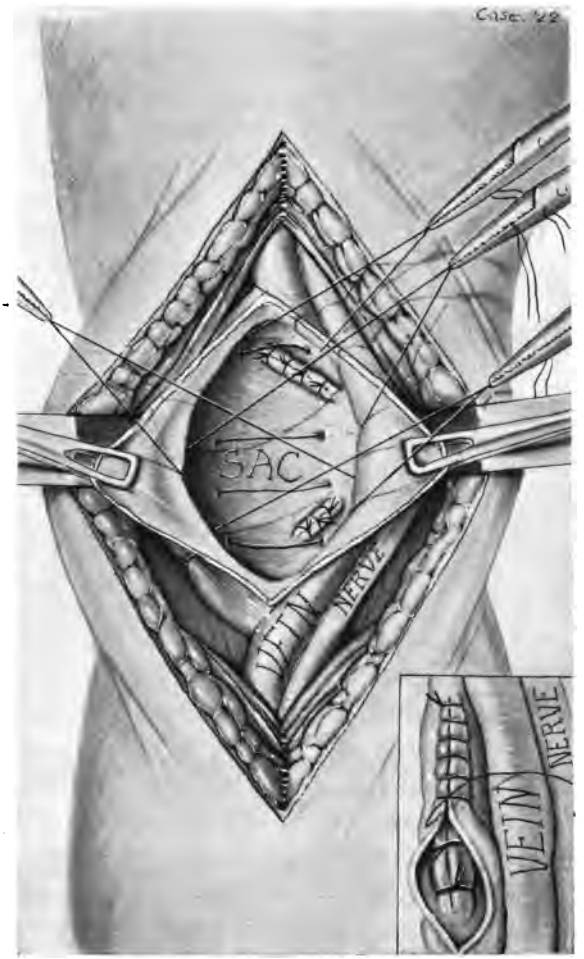

Fig. 518.—Showing Matas restorative endo-aneurysmorrhaphy of sacciform aneurysm. Insert shows obliteration of sac.

nerve. We can now identify the sac, the two former structures being on the externolateral aspect of the sac. We shall now apply the tourniquet. An incision is made into the sac. There

is an absence of clotting. We find two openings, an upper large one and a lower small one. I take this to be an aneurysm of the sacciform type, this upper large opening being the opening into the main artery, the lower being a collateral. This being the case, we can do a restorative endo-aneurysmorrhaphy. I now suture the upper opening with chromic catgut, reinforcing the first line with another layer of sutures. We shall do likewise with the small opening. I shall examine the sac and see if there are any more openings. I find none, so it is safe to release the tourniquet. We find we have no bleeding. We were correct in our presumption that this is a sacciform aneurysm, as I find pulsation beneath the sac.

We shall be able in this case to obliterate the sac completely by intrasaccular suture, obliterating in this way all the dead space. I now suture the deep fascia and close the skin with silkworm.

Note.—Eleven hours after operation pulsation in both tibial arteries was as good as before the operation. The wound healed by primary intention.

I should like to show you the case of P. M., who at my request reported for examination. He is fifty-two, and was operated three years ago. We have showed you this morning the most frequent type of surgical aneurysms. This other case is probably the rarest, namely, aneurysm of the superficial palmar arch. Our first case illustrates the restorative operation, this other case the obliterative endo-aneurysmorrhaphy of Dr. Rudolph Matas. The history is as follows:

While unloading coal he missed the coal, and struck the side of the car with the shovel, the handle hurting his hand. He noticed a small lump, which he poulticed, without result. This happened four or five months before operation. Some time later he fell on his hand, and the tumor became flat. He thought he had ruptured it, but when he looked at his hand he saw that it had reappeared. It has been the present size for three months.

Examination showed a pulsating tumor on the ulnar side of the hand. Pulsation stopped by pressure on both radial

and ulnar arteries, but returned on release of either artery, and was strong on release of the ulnar. The tumor could be collapsed by pressure, and remained collapsed by pressure on the radial and ulnar arteries, but refilled on the release of either. There was a marked arteriosclerosis, blood-pressure of 110, and a positive Wassermann.

Operation (June 2, 1919) at office: Injection paraneural of ulnar and median nerves with 1 per cent. novocain with adrenalin. Superficial skin injection in line of incision with ½ per cent.

Fig. 519.—Result of obliterative endo-aneurysmorrhaphy of aneurysm of superficial palmar arch.

apothesine with adrenalin. The ulnar and radial arteries were exposed, and Crile clamps applied in an attempt to avoid a tourniquet to compress the brachial, as the operation was under local analgesia. Bleeding was not controlled, however, and the tourniquet was applied above the elbow. An incision was made in the long axis of the aneurysm, the aneurysmal sac was incised, the clot removed, and two slit-like orifices found and sutured with silk. The orifices were about ⅜ inch apart, and in the proximal portion of the sac. After suturing the orifices the sac was obliterated by catgut sutured within as

much as possible, and by lateral gauze compression obtained by tying the gauze under silkworm sutures, which produced a central ridge which subsequently disappeared by massage.

June 11th to 14th the sutures were removed. Massage was begun June 21st, and he began hoeing that day. July 21st he reported he had been chopping wood for a week. The hand was almost normal in appearance. Examination (November 18, 1919, and May 20, 1922) showed the hand to be normal.

We have adopted in both these cases the intrasaccular suture as suggested by Dr. Rudolph Matas. In popliteal aneurysms, which by their frequency offer the best opportunity for comparison of operative results, Dr. Matas has shown the superiority of endo-aneurysmorrhaphy over the ligature. In 1913 at the International Congress of Medicine in London, in the Section of Surgery, he reported 130 cases of popliteal aneurysms treated by this method, with 93.1 per cent. cures. At the same Congress were reported 23 cases treated with the Hunterian ligature, with 82.7 per cent. cures. Not only the greater percentage of cures but also the comparative simplicity of technic makes the Matas operation the operation of choice "in all regions in which a perfect prophylactic hemostasis can be obtained."

As to the so-called ideal operation we quote from the same author the results of his analysis of the reported cases:

1. That it is a difficult operation to do in a correct technical way; at least in a way that will accomplish, even temporarily, the purposes for which it is intended.

2. That in many cases of pathologic aneurysms in arteriosclerotic subjects it is often impossible to put it into practical execution, owing to the great difficulty of adjusting and suturing accurately the often rigid pipe-stem terminals of the divided aneurysmal artery, and more especially when the procedure is complicated by the interposition of a graft to bridge over the gap caused by an extensive resection.

3. That even when the anastomosis is technically successful it is a failure physiologically in fully 80 per cent. of the cases.

4. That in fully 75 to 80 per cent. of the reported successful cases in which it has been performed there is every reason to

believe, judging by the condition of the peripheral pulses, that the collateral circulation was quite adequate and efficient, and that if the condition of the collateral circulation had been tested, it is probable that in fully 75 or 80 per cent. of the reported cases the anastomosis would have been found to be unnecessary.

5. That while a considerable degree of skill and preliminary training on the cadaver and on the lower animals is required to do an end-to-end anastomosis that is a technical success, no extraordinary demands are made upon the qualifications of the surgeon who is called upon to do an intrasaccular endo-aneurysmorrhaphy. All that is required for the intrasaccular suture in any one of its three types is the punctilious observance of asepsis, and that ordinary care in technic that is required to close an intestinal wound or to do a lateral enterorrhaphy.

6. That the comparative statistics of the two methods—the intrasaccular and the so-called "ideal"—show thus far that the results in mortality, secondary hemorrhage, lesser number of gangrenes, and permanence of cures, are plainly in favor of the simple procedure of endo-aneurysmorrhaphy.

I should like to call to your attention the last published statistics of Dr. Rudolph Matas, in Surg., Gyn., and Obst., of May, 1920:

Total cases up to December 31, 1915	289
Eliminating 6 cases—4 fatal inoperable aortic aneurysms and 2 accidental deaths—leaves a total of	283
Deaths	13, or 4.5 per cent.
Operative cures and recoveries	270, or 95.4 per cent.
Cases of gangrene	12, or 4.2 per cent.
Secondary hemorrhages	6, or 2.1 per cent.

Of 289 operations, there were of the

	Cases.	Per cent.	Deaths.	Per cent.	Gangrene.	Per cent.
Obliterative type	193	66.8	10	5.3	9	4.6
Restorative type	65	22.5	2	3.0	1	1.5
Reconstructive type	31	10.7	1	3.2	2	6.4

TENDON RECONSTRUCTION

THIS case reported to us today for a condition of no particular interest, but while he is here I should like to show the result

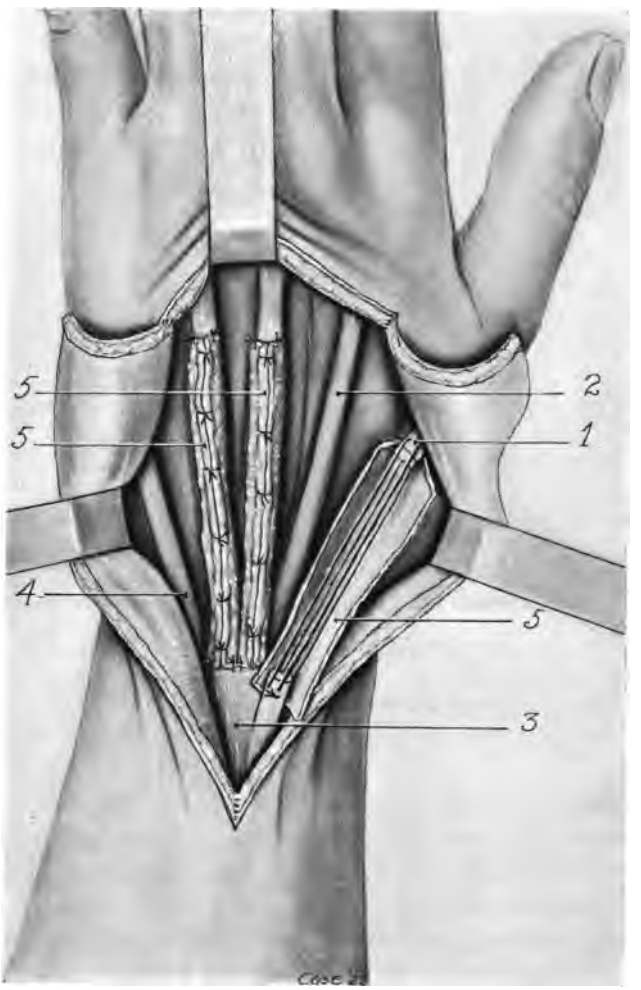

Fig. 520.—Tendon reconstruction: 1, Extensor longus pollicis. 2, Extensor indicis. 3, Extensor communis digitorum. 4, Extensor minimi digiti. 5, Fascia lata transplants.

of a tendon reconstruction which we did in May, 1920. He came to us with inability to extend the middle and ring fingers and the terminal phalanx of the thumb. The history was that three months previously he ran his hand through a broken window pane. He went to one of the local hospitals, where the tendons (as well as the skin wound) were sutured. Splints were removed in two weeks. He noticed his disability shortly afterward. In this case the extensor communis digitorum and

Fig. 521.—On left: Character of disability following injury to extensor communis digitorum and extensor longus pollicis. (Photograph taken after operation for purpose of illustration.) On right: Extension of middle and ring fingers and terminal phalanx of thumb following reconstruction of tendons.

the extensor longus pollicis had been severed. Figure 521 shows the character of the disability. The extensor indicis and the extensor minimi digiti had not been severed, and, consequently, the patient was able to extend both the index- and ring fingers.

Under local analgesia the proximal end of the extensor communis digitorum was identified; the tendon had been severed near the muscle belly, and a space of 2½ to 3 inches intervened between the tendon ends. The patient was then given a general anesthetic. The tendons of the middle and ring fingers were

attached to the common extensor tendon by a continuous suture, each new tendon being composed of four strands of No. 9 silk thread. The proximal end of the extensor pollicis muscle was not found, but a similar four-strand tendon was made, connecting the distal end of the extensor pollicis to the severed tendon of the common extensor, which had been attached to the index-finger. An incision was then made in the thigh, and fascia lata with fat attached was obtained, and each silk tendon was surrounded by a tube of fascia lata, which tube was attached by sutures to the severed tendon ends. The wound was closed without drainage, and the arm placed in hyperextension on molded plaster splints. An oily discharge occurred from the wound in a few days, and continued for several weeks. There was no evidence of infection. Splints were removed in two months. The hand now functions as a normal hand, the patient using his new extensor longus pollicis independently of the middle and ring finger tendons.

CLINIC OF DR. W. P. BRADBURN

CHARITY HOSPITAL, NEW ORLEANS, LA.

INFECTION OF THE BLADDER AND KIDNEYS, ASSOCIATED WITH CONGENITAL DEFORMITY OF THE LUMBOSACRAL SPINE

INSTEAD of presenting cases upon which we shall operate, we have decided to exhibit a group of cases all of which have been of intense interest to us, and each of which, we believe, carries some definite lesson.

H. G. S., a white male, age twenty-four, and a barber by trade, was first seen in November, 1920, at which time he complained of inability to control his urine, and marked pain whenever the bladder emptied. This condition had existed from childhood, and he had worn a urinal practically all his life. The control was worse at nights. The family history was negative for any chronic diseases or deformities. The patient's previous medical history was negative except for the usual diseases of childhood. His condition at the time he was first seen is best set forth in extracts from a letter written by himself:

"My first examination was at six months, in regard to my feet, and what seemed to be a large growth to the right of the back, just about the hip. Three family doctors advised my parents to let nature have its way. When it was seen that I had no control of urination, they were consulted again, but could see nothing except the spine which could cause my trouble, and they could not see anything to be done. When I was seventeen years old I decided to see what could be done for myself. I first consulted a urinary specialist, who pronounced it nervous trouble, caused from the spine. He sent me to an orthopedic institution, where they said there might be some chance of straightening my spine, but they did not advise it. After ex-

amination in several other clinics, it was again pronounced nervousness, caused from the spine, and they did not advise operation or treatment."

When the case was first seen examination revealed a moderately well-nourished white male, about 5 feet, 4 inches in height. Heart and lungs negative, abdomen negative. There was slight pain in the region of both kidneys, more marked on the left, and the patient stated that he had frequently had pain in this region, not very severe, however, which he had attributed to "bowel trouble." Examination of the spine was negative except in the lumbosacral region, where there was a marked curvature, with a decided prominence about the region of the right sacroiliac joint, and some flattening in the same region on the left. The interbuttock fold was practically absent except near the anus. The genitalia were negative. The prostate was increased in firmness and in size laterally, but was not otherwise abnormal. The leg muscles were poorly developed and the feet were of the contracted type. The nervous system was negative except that the patella reflex, though equal on both sides, was more active than is usually seen.

The urinalysis showed an appreciable trace of albumin and innumerable pus-cells, and the stained sediment showed large numbers of Gram-negative bacilli and spermatozoa. Irrigation of the bladder showed its capacity to be slightly over an ounce, and an attempt to introduce more resulted in marked irritability and pain; indeed, the patient actually fainted on several occasions. Irrigation was continued daily, using a 1 : 5000 solution of potassium permanganate. Later boric acid and saline solutions were used, instilling afterward ½ per cent. protargol solutions.

Treatment was continued along these lines, and about the first part of December, 1920, when the bladder capacity had been increased to 4 ounces, further investigations were begun. Cystoscopic examination of the bladder showed a slight edema of the trigone, with apparently some scarring, giving the idea of healed ulcerations running down toward the prostatic region. The lateral lobes seemed to be slightly enlarged, and there was an apparent absence of a median lobe. The prostatic urethra

showed a marked hypertrophy of the verumontanum, which appeared to be about ¾ inch in height from the urethral floor, about ½ inch in width at the apex, and slightly smaller at the base. Near the top were two openings, through which our

Fig. 522.—Case I. Showing dorsal and lumbar spine.

usual ureteral catheter, a No. 6, could be passed about ½ cm. These were taken to be the orifices of the ejaculatory ducts. The catheters were easily passed into the kidneys, and the urine from both was distinctly cloudy, more markedly so on the left. Microscopic examination showed many pus-cells and Gram-

negative bacilli in both specimens. Routine lavage of the kidneys was then begun, using $\frac{1}{5}$ per cent. silver nitrate at first, which was later increased to $\frac{1}{2}$ per cent., and still later $\frac{1}{2}$ and 1 per cent. mercurochrome was used.

The improvement in the case was evident from the beginning of the bladder irrigations, and was distinctly marked after lavage

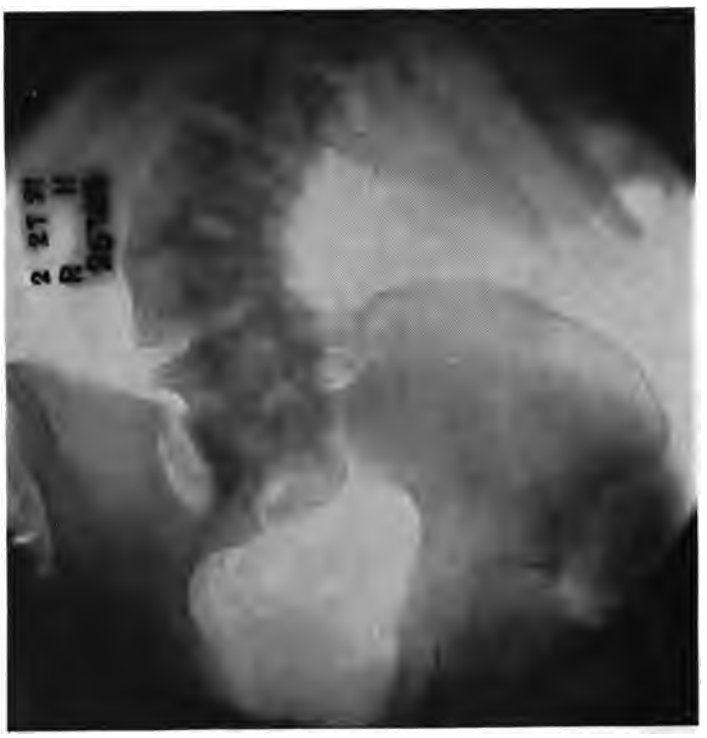

Fig. 523.—Lumbosacral spine showing marked deformity with fusion of third and fourth lumbar vertebræ, also no evidence of renal calculi.

of the kidneys was begun. After about eight months of treatment he was able to control the urine completely at night, emptying the bladder probably once during the night, but there was no further bed wetting. For the past year he does not empty the bladder at nights, except upon retiring and arising. During

the day urination became less frequent and distinctly less painful, and finally, about November, 1921, he had practically complete control, wearing the urinal only as a protection in the street car and under similar conditions, when some urine would escape. Since the middle of April, 1922 he has had complete control, and has discarded the urinal entirely. There are still pus-cells and

Fig. 524.—Showing sacrum, coccyx, and pelvic bones more definitely. The marked congenital anomaly of sacrum and coccyx is well shown, these two bones being practically absent. No evidence of calculi in ureter or bladder.

spermatozoa present in the urine, and occasionally Bacillus coli. The left kidney is practically clear. The right still shows slightly clouded urine, with pus-cells and Gram-negative bacilli.

Coincident with the improvement in the infection of the bladder and kidneys there was a marked improvement in his physical and mental condition. Previously he was despondent,

morose, avoided associates, and would not indulge in any pleasures. Now his mental attitude is completely changed, he seeks associates, and enjoys the pleasures which he formerly avoided. His complexion is better, and he has gained about 20 pounds, with development of the leg muscles, as well as a general improvement in muscle tone and firmness throughout the body.

Fig. 525.—Bladder, prostatic urethra, and the ureters. The bladder is pointing toward the left. The two spots laterally near the base of the bladder are the ejaculatory ducts. The instillation was made through the urethra with a Triumph syringe, using a 25 per cent. sodium bromid solution.

The plates in this case were taken for us by Drs. Samuel and Bowie at Touro Infirmary, and we wish to thank them for working up the details of the case radiographically.

Figures 522–524 show the entire urinary tract, which fails to reveal any evidence of stone. There is a congenital fusion of the

third and fourth lumbar vertebræ, and a congenital anomaly of the sacrum and coccyx, the latter two bones being practically absent.

Figure 525 shows the bladder, prostatic urethra, and the ureters. The bladder is pointing toward the left. The two spots

Fig. 526.—The kidneys. The right kidney occupies the median line, just anterior to the spine, at the point of the maximum deformity. Both pelves are apparently normal.

laterally near the base of the bladder are the ejaculatory ducts. The instillation was made through the urethra with a Triumph Syringe, using a 25 per cent. sodium bromid solution.

Figure 526 shows the kidneys themselves. The right kidney occupies the median line, just anterior to the spine, at the point of the maximum deformity. Both pelves are apparently normal.

Figures 527–529 are pictures of the boy himself, and it is surprising to note how little outward deformity there is. When he is dressed there is no evidence of the deformity in his gait or bearing.

Fig. 529.—It is surprising to note that when dressed there is practically no evidence of deformity in gait or bearing.

Fig. 528.—Posterior view.

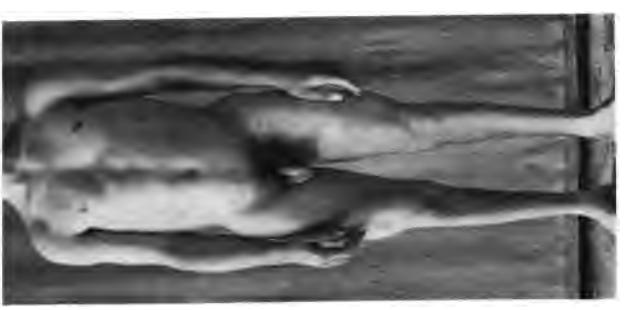

Fig. 527.—Anterior view.

The lesson to be drawn and the point I wish to stress in presenting this case is this: No matter what deformity or abnormality may be observed in any case, do not fail to make the same complete examination that you would if it were not present. Do

not be biased in your conclusions by an apparent explanation or cause for the condition in question. *Prove your point.* The lack of control in this case was not due to the deformity of the spine, or to any nerve condition resulting from it, but to an infection of the bladder and kidneys. This is the type of case where steady work in the face of difficulties will bring its own reward. It is needless to point out what the effect on this patient's future will be.

FRACTURE OF THE SIXTH CERVICAL VERTEBRA

G. H. W., a white male, age forty-one, foreman of an oil distillery, walked into my office March 14, 1922, stating that while attending to the removal of some overhead pipes, one was dislodged and fell about 6 feet, striking him on the head midway between the occiput and glabella. He was knocked backward out of the door, and was unconscious for a few moments. When

Fig. 530.—Crushing injury of right side of sixth cervical vertebra extending transversely.

I saw him, some four hours later, he was complaining of a lacerated wound of the scalp, severe headache, and pain in the back of his neck. There was also a tingling sensation extending down the right arm to the hand. There was a slight rigidity of the muscles of the neck, and palpation elicited a tender spot, located in the region of the fifth and sixth cervical vertebræ. The head

was held slightly forward, and he seemed afraid to turn it to either side. Figure 530, taken by Drs. Samuel and Bowie at Touro Infirmary, shows very prettily the fracture of the sixth cervical vertebra on the right. The pain in the neck, as well as the tingling sensation down the right arm, were thus easily explained by the involvement of the brachial plexus.

The patient was immediately put to bed, with the head of the bed elevated 12 inches, and a leather suspension brace with a 2-pound weight attached was applied to the head. The relief

Fig. 531.—Three months after injury, anterior view.

was very rapid, and within twelve hours there was a distinct lessening of the tingling sensation complained of. When a 3-pound weight was attached at the end of twenty-four hours the patient complained of discomfort, and a return of the tingling sensation, so the 2-pound weight was reapplied. There was a steady improvement in his condition, and May 27th a Thomas collar was applied. It might be well to point out here that the main point of the Thomas collar is to supply a support that is firm, but that at the same time shall be flexible in application.

Wooden tongue depressors separated about $\frac{1}{16}$ inch were incorporated in two layers of adhesive plaster. This was then cut to the paper pattern (previously made and fitted to the patient), and cotton batting was rolled and sewed on the upper and lower edges to prevent pressure. The patient was kept in bed a week

Fig. 532.—Case II. Three months after injury. Position is good. Note evidence of callus on anterior aspect of vertebræ.

after this collar was applied, and then allowed up in a rolling chair. At the end of a month he was allowed to walk about, and was discharged from the hospital April 25th to visit his family in another city. At this time there was complete absence of the tingling in his arm and hand, but some numbness in the thumb, most marked when he attempted to pick up some article.

The collar was worn steadily until May 1st, when it was removed daily to permit the use of hot and cold applications to the neck muscles, and very gentle massage. Slight passive motion was also employed. The collar was permanently removed June 1st, and on June 15th there was no limitation of motion in any portion of the neck. Figures 531, 532 taken at this time are very interesting, showing some evidence of callus on the anterior aspect of the vertebra. The patient's general condition is excellent. At times there is slight pain in the interscapular region, but the right arm and hand have cleared completely, and he will be allowed to return to work July 1st.

The lesson to be drawn from this case is as follows: After a head injury, or any type of injury which involves a violent or sudden motion of the head or neck, and particularly if the patient complains of pain in the neck afterward, it is well to examine the neck carefully for localized pain or muscular rigidity, and to have an *x*-ray made. This case is like another I saw two years ago: A little girl fell into a hole in the sidewalk, and when I saw her, two weeks later, she was complaining constantly of pain in the neck. The *x*-ray made at that time showed a fracture of the fourth cervical vertebra. In this case a Minerva jacket was applied, and immediate relief obtained. So again I would urge, *use the x-ray after an injury* when there is the least doubt, and do not be too quick to say "contusion or sprain," and so settle the origin of the pain, thereby missing the true diagnosis.

TUBAL PREGNANCY, WITH RUPTURE

MRS. H. M., white female, age twenty-seven, was seen by me May 17, 1922. About noon her husband had phoned the office, asking me to call to see his wife, after office hours, as she was not very well. Some three hours later he decided to bring her to the office instead, and brought her up in a taxi. Before I saw her in the office she collapsed in the waiting room, and was given first aid by one of my confrères. I learned later that she had had a couple of fainting spells in the taxi, but had revived with the use of aromatic ammonia. When I saw her she looked extremely sick. Her color was ashen, the radial pulse about 100, and of very poor volume, temperature 97.6° F. Her history showed that she had menstruated normally April 28th, but about May 7th she noticed a slight bloody discharge, not sufficient to require the use of a napkin. There was no nausea, but she had had a sense of uneasiness in the pelvis since that date. Shortly after noon May 17th she had a severe pain in the region of the gall-bladder, followed by collapse, and her husband stated that from that time her color, which is usually ruddy, was ashen. A rush blood count showed a total of 26,500 whites and 91 polys. Examination of the uterus showed it to be normal in size, but slightly soft; tenderness in the adnexal regions prevented a more careful differentiation of pelvic pathology.

On the history, the acute onset, and particularly on the blood count, a diagnosis of ruptured extra-uterine pregnancy was made, and the patient was admitted to the hospital and prepared for immediate operation. Under gas-ether anesthesia a median incision was made, and immediately on opening the peritoneum a quantity of free blood and blood-clots was found. Pelvic examination showed a ruptured right extra-uterine pregnancy. Clamps were applied to check the bleeding and an intravenous saline infusion begun. The patient's pulse was allowed to improve, and a rapid removal of the right tube and ovary was then done.

Before the operation the pulse was barely perceptible, but on her return to the ward it was 104, and distinctly better volume. It ranged as high as 122, gradually dropping until it reached 80 at the time of her discharge from the hospital May 27, 1922. When I last saw her, June 28th, she was in excellent general condition, and seemed to be suffering no ill-effects from her recent experience. Examination shows the uterus freely movable, with no tenderness or thickening at any point in the pelvis.

Two points in this case are interesting, one the psychologic point, for which there is no explanation. This woman's husband, feeling that she was very ill, instead of phoning a second time or waiting for me to call, put her in a taxi and brought her to my office, and this apparently unexplainable act unquestionably did much toward saving her life. But the main point I would stress is the extreme value of the blood count in any case of intra-abdominal hemorrhage. In a ruptured tubal pregnancy both the total and the differential count rise very rapidly, and the count seen in this case is the type usually seen in acute hemorrhage. If the hemorrhage is not severe, or is of the intermittent character, we find the white count running lower, from 10,000 to 14,000, and the differential ranging from 74 to 80. We have presented this case with the idea of emphasizing the great value of a blood-picture as an aid to diagnosis.

BILATERAL INDIRECT HERNIAS WITH ACUTE APPENDICITIS IN THE RIGHT HERNIAL SAC

C. N., WHITE male, aged sixty-three, had been associated with the fire department in the salvage corps thirty-seven years. His family history was negative. He had been seen about two years previous to his admission to the hospital, complaining of a left scrotal hernia (indirect) which was quite large. It was easily reducible, but he complained of some pain and dragging, and operation was advised, which he refused. About sixteen months later a right indirect inguinal hernia developed. This gave him more trouble from the beginning on account of the small opening, but he still could not make up his mind to operation. In December, 1921 there was an incarceration of the right hernia, which he was able to reduce himself before he was seen. At this time operation was again urged, and again refused.

He was admitted to the hospital in the ambulance January 17, 1922, with marked pain in the right inguinal region, and evidence of incarceration of the hernia. The patient stated that he had attempted to reduce the hernia for two days previously, but without success. His temperature was 102° F., and immediate operation was advised. An attempt was made to use local, but when the skin was opened, there seemed to be so much inflammatory reaction present that ether was at once resorted to. After the external oblique had been cut through, the tissues were found even more edematous, and on cutting the cremasteric, some little fluid was noted. An edematous mass of tissue, which seemed to be necrosed at one point, was picked up from the canal, and examination showed an opening from which pus was exuding. There was difficulty in identifying the structures because of the edema, but we decided that this was the sac, and incised to the internal ring. To our surprise, a considerable quantity of pus was found, and

the following pathology: the base of the cecum was against the neck of the sac on the abdominal side, and the appendix and meso-appendix were the only contents of the hernial sac. It had ruptured and an abscess formed, and the cecum was acting as a plug to protect the abdomen. The meso-appendix was gangrenous and easily separated. A ligature was thrown about the base of the appendix, and the appendix was removed. The cecum was not disturbed from its safety position. The entire wound was left open, except for a few silkworms in the skin, and tube drainage into the sac was instituted. No further

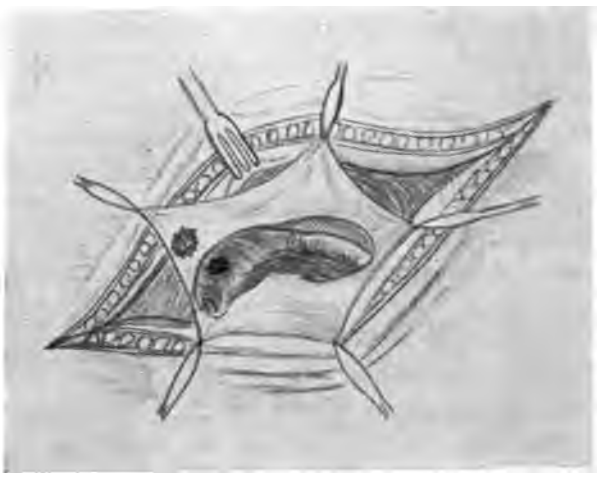

Fig. 533.—Ruptured appendix in hernial sac, with rupture in sac and base of appendix at neck of sac, cecum walling off abdominal wall.

procedure was attempted because of the patient's general condition. Hypertonic saline solution was used as a wet dressing until January 26th. There was no discharge after February 6th. The drains were partially removed January 18th, and completely removed January 23d. The wound was allowed to granulate, and later adhesive straps were used to coapt the skin edges. The temperature was normal after January 27th.

After operation we obtained a more careful history from the patient, particularly in regard to the onset of the attack. He stated that for six days previous to his admission to the

hospital he had had some pain in the region of the sac, with nausea and vomiting, followed by general abdominal pain, which gradually increased in severity and localized in the region of the hernia, while the hernia became progressively larger and more tender.

Having learned his lesson from the right side, the patient decided to permit the hernia on the left to be corrected, which was done without difficulty under local analgesia February 23d, using the typical Bassini technic. He made an entirely uneventful recovery. At present the result on the left is completely satisfactory. On the right there is a bulging over the inguinal canal, but this does not extend down into the scrotum. The opening is quite large, and there is no suggestion of incarceration. He will return to work June, 1922.

The point to be stressed in this case is the wisdom of operation in hernias which give pain or inconvenience, and particularly in the incarcerated type, even when the incarceration can be readily reduced. The unusual feature is the attack of acute appendicitis within the sac which only the appendix had entered, and the plugging of the abdominal cavity by the cecum, with the consequent protection against contamination.

CLINIC OF DR. JAMES E. THOMPSON

JOHN SEALY HOSPITAL, GALVESTON, TEXAS.

ATYPICAL PLASTIC OPERATIONS FOR CONGENITAL FISSURES OF THE LIP AND PALATE

THE first 2 cases to be presented are examples of congenital fissure of the lip and palate. They are described because they are atypical. Their peculiarities are not congenital, but are the direct result of failure of union or improper procedures in previous operations.

Failure of union after operations on the lip or palate should seldom happen if the steps of the operation are planned properly and executed skilfully. But, while clean healing is absolutely necessary, the cosmetic result may leave much to be desired unless careful measurements are taken and every rule of plastic surgery is carefully observed. In repairing a complete fissure of the lip extending into the nostril there are three fundamental points that must always be kept in mind: (1) The curve of the deformed nostril must be restored so that it will resemble the sound one in every detail; (2) the lip must be made long enough; (3) the vermilion border must be restored.

The last two requirements are easily satisfied if care is taken to measure the length of the incisions used in paring the edges of the cleft. It is, however, a more difficult matter to repair the nostril. For, unless the greatest care is taken, the result will be very disappointing. It will not suffice merely to bring the nostril inward; the ala nasi must also be curved inward and forward until it is brought into the same relationship with the columella and philtrum that the sound ala occupies. To accomplish this the incision used to pare the edge of the lateral margin of the cleft must be curved outward so that its upper part will pass under the horn of the deformed nostril. If due

care is now taken to adjust and suture the pared edges of the cleft, the horn of the ala nasi will be curled inward and carried into the correct position, provided that the undercutting has been properly carried out. It is a difficult matter to estimate the degree of undercutting unless careful measurements are made beforehand. Even where it has been gaged accurately and the normal curve of the nostril restored perfectly, there is a strong tendency for the flattening of the nostril to reappear. There are probably two main reasons for this: one is due to the imperfectly reconstructed alveolar border which gives no support to the nostril, the other to the resilience of the alar cartilage which has a tendency to spring back to its original flattened shape.

A method of measuring accurately the degree of undercutting has been described by the author in the Transactions of the Southern Surgical Association for 1921.

Case I.—C. S. Male, white, aged six. Congenital fissure of the lip and palate in which the lip had been operated upon twice unsuccessfully with the result that the philtrum had been completely destroyed.

The deformity of the face is shown in Fig. 534. On the left side the fissure of the lip was complete into the nostril; the alveolar border was cleft and the fissure extended backward through both hard and soft palate. On the right side the margin of the nostril was intact, but the rest of the lip was fissured. The anterior margin of the alveolar border was grooved at the junction of the maxilla and premaxilla. The original skin (philtrum) covering the anterior surface of the premaxilla had been destroyed and replaced by a thin layer of epithelium of low vitality resting on a base of dense scar tissue. The surface was ulcerated in several places. There were no erupted teeth in the premaxilla and the *x*-ray showed the presence of only two tooth germs which probably represented the permanent central incisors. The temporary teeth had probably been extracted during previous operations.

On the palatal surface (Fig. 535) union of maxilla and pre-

maxilla was complete. The septum was attached to the right edge of the palatal fissure. The premaxilla was separated from the front of the left maxilla by an interval of about 3 mm. The palatal plates on both sides were very precipitous. The free edge of the left palatal plate was fully 2 mm. higher than

Fig. 534.—Photograph of the facial deformity in Case I (C. S.). The philtrum has been completely destroyed. The premaxilla is covered in front by a thin layer of epithelium of low vitality.

that on the right side, which was attached to the septum. The palatal fissure was not more than 5 mm. wide at its widest part. The mucous membrane covering the palatal plates was perfectly healthy. No operation had been performed on the palate.

The following sequence of operations was decided upon: (1) The repair of the palate and the replacement of the premaxilla; followed by (2) repair of the lip and nostrils.

Repair of the Palate.—This was done on January 9, 1922. Langenbeck's side incisions were used, and the palate was repaired from end to end in the usual manner without any difficulty. Mattress sutures of silkworm-gut were used in both hard and soft palates. A wedge-shaped portion of the septum was removed and the premaxilla pushed back into place. It

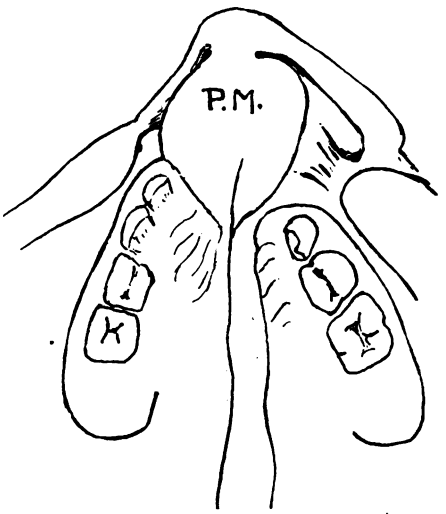

Fig. 535.—Life-sized sketch of a plaster mold of the palate of Case I (C. S.). The premaxilla is attached to the front of the right maxilla. The septum is united to the free edge of the right palatal plate. The palate was uninjured.

was not sutured to the left side of the maxilla, but held in place by a strip of adhesive plaster passed over its anterior surface and fastened to the cheeks. The palate healed from end to end by first intention. Unfortunately the adhesive plaster irritated and destroyed the skin covering the premaxilla; therefore it was removed in thirty hours. The premaxilla, in consequence, did not stay in contact with the left maxilla, but projected forward again. (A sketch of a plaster cast of the healed palate is shown in Fig. 536.)

On April 6th the premaxilla was molded into place once more. After denudation of the opposed sides of the premaxilla and left maxilla a silver wire suture was passed through the front of the left maxilla and around the premaxilla, and the two bones brought into contact. After three weeks the wire was removed and firm union resulted.

Repair of the Lip.—The problem presented by the lip and nostril had received careful study beforehand, and I was fortunate in having the advice of Dr. V. P. Blair, of St. Louis, in

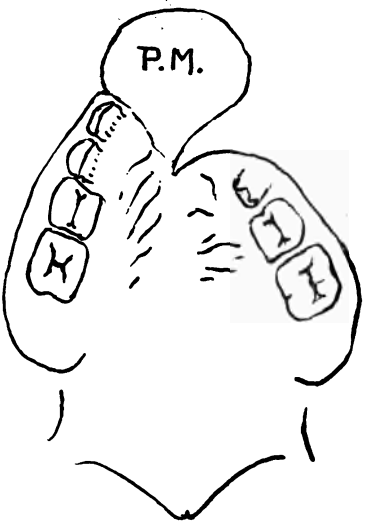

Fig. 536.—Sketch of same palate shown in Fig. 535 after successful repair of the palate from end to end. Premaxilla in vicious position before replacement at second operation.

the final selection of the steps of the operation. The philtrum had been completely destroyed during the previous operations, and the epithelial covering of the premaxilla was of such low vitality that it was useless for any purpose. The left nostril flared wide open and the ala nasi was separated from the columella for a considerable distance. The right nostril was completed by a ring of normal tissue. Below this the right margin of the cleft flared outward at a sharp angle. The margins of the cleft were separated from one another by a distance of 32 mm.

Fig. 537.—Sketch of plaster mold of nostrils, premaxilla, and margins of the cleft. This serves as the basis on which Fig. 538 is planned.

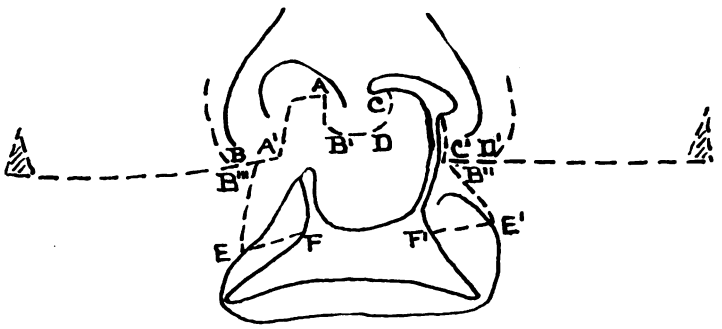

Fig. 538.—Same outline as Fig. 537, showing the incisions into the cheek as interrupted lines (dashes). The lettering on the *right* side distinguishes the following points: *B* is placed at the outer horn of the ala nasi at the point where the incision curves upward around it. *A'* is at the inner horn of the ala nasi. *A* is on the circumference of the nostril where it joins the columella. *B'''* is on the cheek just under the outer horn of the ala nasi. *E* is on the mucocutaneous line of the lip. *F* is on the free border of the mucous membrane. The semicircle bounded by the letters *A–B'–D–C* represents the base of the columella. The point *C'* on the left side corresponds to *A'* on the right; *D'* to *B.*; *B''* to *B'''.*; *E'* to *E*, and *F'* to *F*. The points *A* and *C* mark corresponding spots on the right and left edges of the columella. The lateral incisions in the cheek beyond *B* on the right and *D'* on the left are not lettered. At each outer end the triangle of skin to be removed is shown. On the right side all the tissue of the lip mesial to *B'*, *A*, *A'*, *B'''*, *E*, and *F* was removed. On the left side that mesial to *B''*, *E'*, and *F'* was also removed. A strip of the epithelium covering the premaxilla just below *B'–D* was removed.

just below the alæ nasi, and by a distance of 35 mm. at the free edge of the lip. (A sketch of the condition is shown in Fig. 537.) The flaps were planned as shown in Fig. 538. The in-

tention was to make a transverse incision into the cheek on each side just below the nostrils and to bring the two flaps toward the middle line, so that when they were united by their mesial edges they would cover the premaxilla and form a new philtrum. A study of the lateral incisions (Fig. 540) shows that each was carried outward to a point just below the outer angle of the orbit. A vertical cut was made upward behind each ala nasi, the purpose of which was to liberate the ala and allow it to be carried inward in a curve toward the posterior

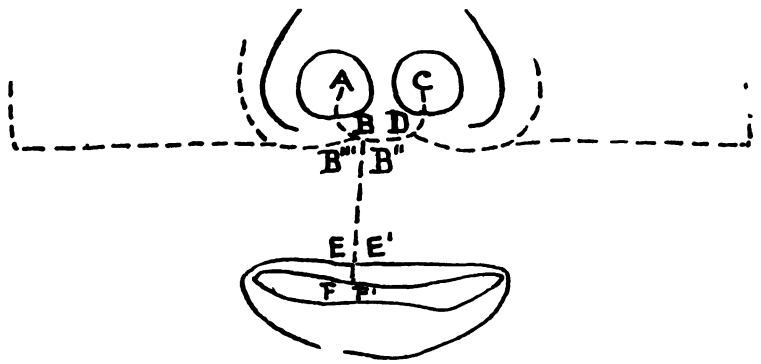

Fig. 539.—The manner of bringing the flaps together. The right nostril is closed by bringing *A'* and *A* together; the left, by bringing *C'* and *C* together. *B* was brought in contact with *B'* and *D'* with *D*. In the figures *A'*, *B'*, *C'*, and *D'* are omitted for the sake of clearness. The corner of the cheek flaps (*B'''* and *B''*) were brought together and united to the under surface of the semicircle between *B'* and *D*. *E* was brought in contact with *E'* and *F* with *F'*, and the lines *B'''–E–F* and *B''–E' F'* were approximated.

end of the columella, to which it was subsequently attached. At the posterior end of each transverse incision a triangular area of cheek was finally excised to smooth out the fold or pucker that resulted when the flaps were put on the stretch and their anterior ends united. The free inner margins of the flaps were pared exactly as is done in an ordinary harelip operation and united together by stitches as shown in Fig. 539. (A full description of each step of the operation is given in the legends attached to Figs. 538, 539.

The result was very satisfactory from the purely operative

standpoint. Good firm union occurred from end to end. From a cosmetic standpoint the result was not so pleasing (Fig. 540). The nostrils were fairly satisfactory, much more so than the photograph suggests. The lip was probably too long (deep), although it is a little too early to speak finally on this point. As time passes the nose will straighten itself out; the nostrils

Fig. 540.—Result of operation on lip of Case I (C. S.). For description see text.

will become less prominent and the lip will become narrower. The most serious disappointment is the mouth. The angles of the new mouth are drawn very close together, and the lower lip has been thrown into an ugly prominent curve, with everted mucous membrane.

As time passes this unsightly appearance will be greatly modified, but will never be remedied completely. It is my

intention to wait for six months or a year, and then to correct these faults. The upper lip can then be shortened by the removal of a longitudinal strip along the scar which passes from side to side below the nostrils. The mouth can be made larger by transverse cuts outward from each angle, carrying the outer end of the lower lip backward to the ends of the cuts, and clothing the raw incision in the upper lip with mucous membrane from the interior of the mouth. If necessary a wedge-shaped portion of the lower lip can be removed to reduce its bulk; or, if eversion still persists, a longitudinal wedge-shaped strip can be removed from its mucous surface.

Case II.—E. M. B. Female, white, aged five. The case is one of left-sided complete unilateral congenital fissure of the lip and palate which had been operated upon several times before. The lip and nostril showed serious defects. The palate had suffered severely, showing complete loss of the central part of the velum on each side and irregular union of the mucoperiosteum in front. The appended outline sketches taken from plaster models show in detail the character of the deformity.

The Lip and Nostril.—The general contour of the lip was not unpleasing. It was of the proper length (depth). There was no notch on its free margin. The mucocutaneous line was defective, showing a distinct break. The left nostril was considerably out of place. Its aperture lay on a plane posterior to its fellow. The ala nasi was displaced outward and backward and flared so as to expose on the surface a demilune of mucous membrane which, under normal circumstances, should have been lying on the floor of the nasal passage. Just below this demilune there was a deep pucker or crypt. The mushroom-shaped curve of the under surface of the nose was quite flattened on the left side. All these features are brought out in Fig. 541, which is a sketch of the lip and the under surface of the nose.

The Palate (Fig. 543).—The alveolar border showed a very narrow fissure between the left central incisor and the canine.

No evidence of the left lateral incisor could be found. Perhaps it had been removed at one of the previous operations. The palate immediately behind the alveolar process was intact

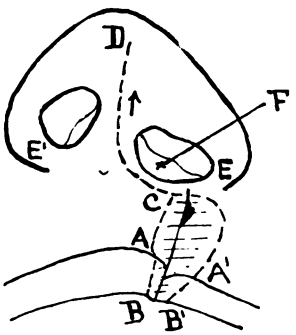

Fig. 541.—Sketch of a plaster mold of the under surface of the nose and the front of the lip in Case II. The letter *E* is placed on the ala nasi of the deformed side; *E'* is on the ala of the sound side; *F* points to the demilune of everted nasal mucous membrane. The other lettering is described in the text. The arrow shows the direction in which the nostril was moved after the left alar cartilage was loosened.

for a short distance; then came an irregular fissure, 12 mm. long, and finally a line of union behind this, which reached to

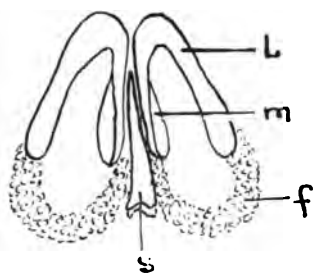

Fig. 542.—Dissection of the under surface of the alar cartilages, the septum, and the fatty substance of the margin of the nose (from Cunningham): *l.* is the crus laterale, and *m* is the crus mediale of the alar cartilage; *S* is the septum; *f* is the dense fatty tissue of the nasal margin.

the level of the posterior margin of the hard palate. From this point the middle part of the velum was missing. The lateral parts of the velum were prolonged backward, diverging widely,

into the palatoglossi and palatopharyngei muscles, between which on each side the tonsils lay. They were unusually large as represented in Fig. 543.

The following sequence of operations was decided upon:

1. Removal of the tonsils.
2. Plastic repair of the lip and nostril.
3. Reconstruction of a new soft palate from the palatoglossi and palatopharyngei and pharyngeal wall.

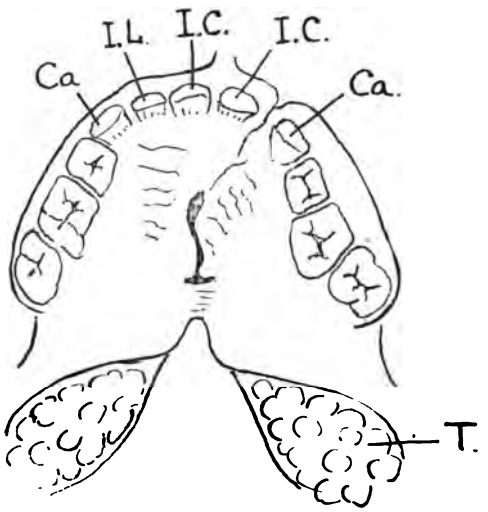

Fig. 543.—Sketch of a plaster mold of the palate in Case II. The fissure in the alveolar border is shown between the central incisor and canine teeth on the left side. The unhealed fissure in the middle of the hard palate is shown by a sinuous black line. The tonsils (*T*), much hypertrophied, lie posteriorly between the divergent palatoglossi and palatopharyngei. The uvula and most of the velum are missing.

4. Closure of the fissure in the hard palate.

Up to the present date the first three steps have been completed in a satisfactory manner.

Removal of the Tonsils.—They were dissected out (May 18, 1922) with extreme care in such a manner as to preserve intact both palate muscles.

Plastic Reconstruction of the Lip and Nose.—This was done on June 6, 1922. The steps of the operation are indicated in

Fig. 541. An incision was carried from the tip of the nose (*D*) backward along the under surface of the middle of the columella to its junction with the philtrum; thence outward below and parallel to the margin of the nostril (shown in the figure by the convex edge of the demilune) across the scar of the repaired lip underneath the ala nasi in a curve, and finally downward in a curve until it reached the red line of the lip at a point (Fig. 541, *A'*) previously fixed. From a point on this line on the sound side (right) of the scar (*C*) another incision was carried in a slightly curved line to the red margin of the lip (*A*). From *A* and *A'* incisions were carried through the vermilion border to points marked *B* and *B'*, the lengths *A–B* and *A'–B'* being made equal. The area included between the letters *B–A–C–A'–B'* was removed completely. It contained all the puckered scar tissue and depressions. The part of the incision corresponding to *C–D* was deepened and the dissection carried between the alar cartilages until the lower edge of the cartilaginous septum was reached. The crus mediale of each cartilage was separated thoroughly from the side of the septum behind, and from its fellow cartilage in front. The alar cartilage on the affected side was now made to slide forward on its fellow, carrying with it the displaced nostril. By this maneuver the margin of the incision on the affected side slipped forward on the other margin, which remained fixed. The edges were now sutured in their new position. The first suture to be passed was that bringing the ala nasi (*E*) into its proper relationship with that (*E'*) of the sound nostril. The next stitch restored the vermilion border of the lip at *A* and *A'*. The edges of the incision were finally approximated and sutured from end to end with the greatest care. In the case under consideration it was necessary to carry the median incision in the columella further forward over the tip of the nose in order to separate the alar cartilages far enough apart to let the left cartilage slide forward. This brought the scar into view. At first it was rather objectionable, but in a few weeks it was hardly noticeable. A study of Fig. 542, which is a sketch of the cartilages of the nose from below showing the relationship of the alar cartilages to one another

and to the lower edge of the cartilage of the septum, will enable the operation to be followed more easily.

Reconstruction of a new velum from the palatoglossi and pharyngei and the pharyngeal wall.

This operation was performed July 1, 1922. The problem to be faced is shown in Fig. 544. After the removal of the tonsils the deep surfaces of the palatoglossi and palatopharyngei had fused together except at their extreme posterior ends. There

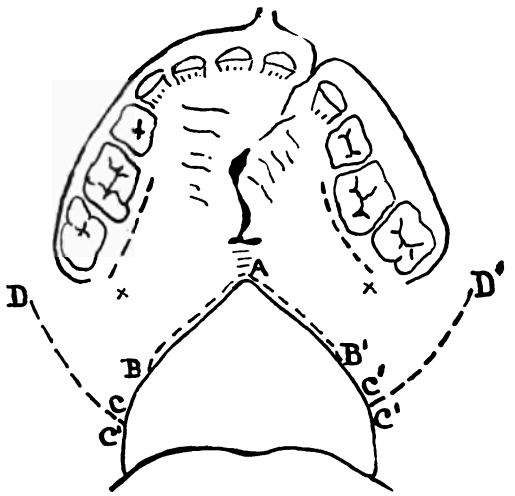

Fig. 544.—The same palate as Fig. 543 after the tonsils were removed, showing the plan of the incisions to repair the soft palate. *C–D* and *C'–D'* are the curved side cuts through the palatoglossi and palatopharyngei; *A–B* and *A–B'* show the denuded areas on the medial edges of the flaps. *X* is over the hamular process. In front of this the dotted line inside the alveolar border represents Langenbeck's side incision.

seemed to be very little muscular tissue present in them. They always appeared to be nearer together before anesthesia than during deep narcosis. Probably the gag had something to do with this.

The plan of the operation was to cut the palatoglossus as near the tongue as possible and to carry the incision upward and outward into the cheek through the mucous membrane lining the angle between the posterior ends of the maxilla and

mandible; then to cut the palatopharyngeus where it fused with the pharynx and to carry the incision through the pharyngeal mucous membrane as high as the Eustachian tube. In this manner a somewhat curved triangular-shaped flap could be thrown upward and inward. The base of the flap abutted on the posterior end of the maxillary alveolar margin and its blood-supply was derived from the descending palatine artery. The outline of the flaps is shown in Fig. 544. They were cut as

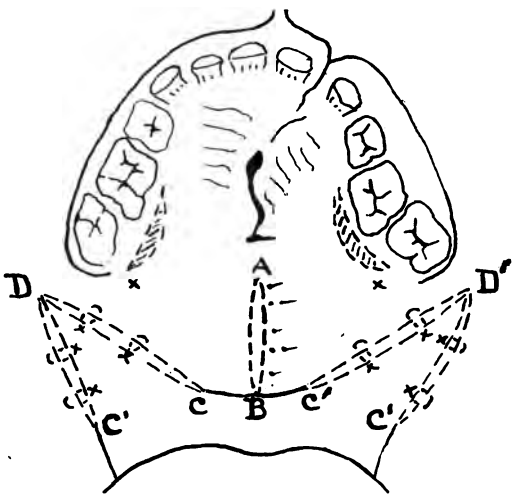

Fig. 545.—The same as Fig. 544, showing the flaps in contact. The V-shaped raw surface left by the side incisions is shown covered over by interrupted stitches. *A–B* is the line of apposition of the medial edges of the flaps *A–B* and *A–B'* (Fig. 544). The line *C–B–C'* represents the lines *C–B* and *C'–B'* (Fig. 544). The mucous membrane of the nasal and buccal surfaces of the soft palate were continuous over the line *C–B–C*.

planned. Bleeding was free but not excessive from the pharyngeal wall. The raw surface of this wall was covered by bringing the edges together with sutures. To a limited extent the edges of the raw surface of the flap were united. We were afraid to pass too many stitches lest we should hurt its blood-supply. The sutures are shown in Fig. 545. Short Langenbeck's side incisions were now made along the inner margin of the alveolar processes on each side and the remains of the velum palati

lifted up from its bed until it was free from all tension. Finally the mesial edges of the flaps were pared and sutures passed. Following our usual custom, we used vertical mattress stitches of silkworm-gut. Union by first intention followed. The reconstructed palate was firm and strong, although somewhat short and stubby.

At the time of writing, the fissure in the anterior part of the palate has not yet been repaired. We shall probably postpone this operation for several months to allow the posterior part of the palate to become thoroughly vascularized.

TUMORS OF BONE

DURING the past few years unusual interest has been aroused in the study of bone tumors, which is the direct result of the researches and insistent teaching of a group of surgeons and pathologists, among whom Bloodgood stands pre-eminent. As a result of this activity a mass of unimpeachable evidence is accumulating which will probably enable us in a short time to distinguish without error between benign and malignant tumors. Up to a few years ago a surgeon of average pathologic training made no distinction between the different kinds of central or myeloid tumors of bone. To him they were all malignant, one of the varieties of sarcoma, and as such were to be eradicated only by amputation or extensive excisions. This led to deplorable mutilations, which, in the light of our present knowledge, were absolutely unnecessary and unjustifiable.

Most pathologic museums, in which specimens of bone tumors have been preserved during the last forty years, are permanent records of such mistakes. The majority of the specimens labeled giant-celled sarcoma, when re-examined, have proved to be examples of tumors which are now included among the benign growths. Nowadays they are usually grouped in the same class with giant-celled epulis and both are commonly spoken of as "benign giant-celled tumors." In the past they were placed among the sarcomata, and in consequence have been included in every statistical table that has been compiled for the purpose of estimating the duration of life. It is obvious that figures obtained from such sources are unreliable and that the truth cannot be reached until the lists have been revised. As far as I have been able to gather, no table of cases of any importance is accessible, in which care has been taken to exclude benign giant-celled tumors, except one published recently by Meyerding, of the Mayo Clinic.

The older surgeons from the time of Sir Astley Cooper to that of Sir James Paget seemed to have had a very definite

belief that tumors arising from the central part of the long bones usually pursued a benign course.

Paget in 1854 presented in his Lectures on Surgical Pathology such a clear description of the group of central tumors of bone, for which he suggested the name "myeloid tumors," that it is hard to understand how his teachings were forgotten. He mentions "that they were first distinguished as a separate kind of tumor by M. Lebert, who called them 'fibroplastic' tumors because they contained corpuscles like the elongated cells or fibro-cells which often occur in rudimentary fibro-cellular and fibrous tumors and in developing lymph and granulations." Paget's description shows such a remarkable insight into the true nature of these growths that it justifies detailed quotation. He goes on to say, "But the more characteristic constituents of these tumors and those which more certainly indicate their structural homology (*i. e.*, their likeness to natural parts) are peculiar, many nucleated corpuscles, which have been recognized by Kölliker and Robin as constituents of the marrow and diploë of bones, especially in the fœtus and in early life. It seems best therefore to name the tumors after this their nearest affinity. On similar grounds they must be considered as having a nearer relation to the cartilaginous than to the fibrous tumors, for, their essential structures, both the many nucleated corpuscles and the elongated cells, are (like those of cartilagious tumors) identical with normal rudimental bone textures. . . .

"The structures of this group of tumors are, indeed essentially similar to those found in granulations which grow from, and may be transformed into, bone; and to a section of such granulations some specimens bear even to the unaided eye, no small resemblance."

Then follows a wonderfully vivid description of the gross physical features of the tumors. "As usually occurring in connection with bones, a myeloid, like a fibrous tumor, may be either enclosed in bone whose walls are expanded around it, or, more rarely it is closely set on the surface of a bone confused with its periosteum. When enclosed in bone, the myeloid tumors usually tend to the spherical or ovoid shape and are well defined

if not invested with distinct thin capsules; seated on bone, they are, as an epulis of this structure may exemplify, much less defined, less regular in shape, and often deeply lobed. They feel like uniformly compact masses, but are, in different instances, variously consistent. The most characteristic examples are firm; and (if by the name we may imply such a character as that of the muscular substance of the mammalian heart) they may be called 'fleshy.' Others are softer, in several gradations to the softness of sizegelatine, or that of a section of granulations. Even the firmer are brittle, easily crushed or broken. They are not tough, nor very elastic, like the fibro-cellular and the fibrous tumors; neither are they grumous or pulpy; neither do they show a granular or fibrous structure on their cut or broken surfaces. On section the cut surfaces appear smooth, uniform, compact, shining, succulent, with a yellowish, not a creamy, fluid. A peculiar appearance is commonly given to these tumors by the cut surface presenting blotches of dark or vivid crimson, or of a brownish or brighter blood-color, or of a pale pink, or of all these tints mingled on the greyish white or greenish basis color. This is the character by which I think they may best be recognized with the naked eye, though there are diversities in the extent and even in the existence of the blotching. The tumor may be all pale or may have only a few points of ruddy blotching, or the cut surface may be nearly all suffused, or even the whole substance may have a dull modena or a crimson tinge like the ruddy color of a heart or that of the parenchyma of a spleen." . . . The description of the microscopic appearance of the tumors, though brief, is correct in all essential particulars. . . . "The microscopic structures suffice for diagnosis; for there is no other morbid growth, so far as I know in which they are imitated. They consist essentially of cells and other corpuscles, of which the following are the chief forms:

"1. Cells of oval, lanceolate, or angular shapes, or elongated and attenuated like fibro-cells or caudate cells, having dimly dotted contents with single nuclei and nucleoli.

"2. Free nuclei, such as may have escaped from the cells;

and among these, some that appear enlarged and elliptical, or variously angular, or are elongated towards the same shapes as the lanceolate and caudate cells and seem as if they were assuming the character of cells.

"3. The most peculiar form:—large, round, oval or flask-shaped or irregular cells and cell like masses, or thin disks, of clear or dimly granular substance, measuring from $\frac{1}{300}$ to $\frac{1}{1000}$ of an inch in diameter, and containing from two to ten or more oval, clear, and nucleolated nuclei.

"Corpuscles such as these, irregular and in diverse proportion, imbedded in a dimly granular substance make up the mass of a myeloid tumor." . . . "Respecting the general history of myeloid tumors, the cases hitherto minutely observed are too few and too various to justify many general conclusions, not that the disease is a rare one; for there can be little doubt that many cases recorded as examples of epulis, of fibrous tumors of the jaws, of osteo sarcoma, and even of cancerous growths about the bones, should be referred to this group." . . . "From these the most general facts I can collect are, that myeloid tumors usually occur singly; that they are most frequent in youth, and very rare after middle age; that they generally grow slowly and without pain; and generally commence without any known cause, such as injury or hereditary disposition. They rarely, except in portions, become osseous, they have no proneness to ulcerate or protrude; they seem to bear even considerable injury without becoming exuberant; they may (but I suppose they very rarely) shrink or cease to grow; *they are not apt to recur after complete removal, nor have they, in general, any features of malignant disease.*"[1]

From the above description it is clear that Paget looked upon myeloid tumors as benign. Why then did surgeons forget his teaching so completely? It is not an easy task to answer this question correctly. The period in which Paget wrote was the beginning of an era of unusual activity in the study of cellular pathology, during which it is probable that the microscopic characters of tumors attracted more attention than

[1] The italics are mine.

their gross appearances and clinical features, resulting inevitably in increasing the importance of the former and lessening that of the latter. The similarity of the cells found in myeloid tumors to those present in tumors of proven malignancy, and the inability of the pathologist of that period to understand the significance of mitoses, made it certain that they would be classified among the sarcomata. Once included among the malignant growths, radical treatment was a logical consequence, and amputation and mutilating excisions became the accepted methods of cure. In this manner surgeons robbed themselves of the opportunity of observing the behavior of the tumors under natural conditions. Fortunately, however, a few surgeons clung to the old traditions, and by their practice and consistent teaching, helped at last by modern pathologic research, have now proved beyond doubt that myeloid tumors are benign. Coincidently the pendulum has swung from mutilation to conservatism.

In the report of the cases of bone tumor which follows 3 cases of myeloma are considered, 2 for the purpose of showing the satisfactory results following local removal, the third as an object lesson of avoidable mutilation. Finally, a case of very malignant osteogenetic sarcoma of the femur is presented, because the patient is still alive at the present time, six years after amputation of the thigh below the trochanters.

The term "myeloma" has been used advisedly for the same reason that Paget preferred the term "myeloid tumor," because these tumors are benign and consist of cells resembling those found in normal marrow.

Case I.—R. J. Female; white; aged thirty-nine; married; the mother of 2 healthy children. Admitted to the John Sealy Hospital February 6, 1922.

Diagnosis.—Myeloma of the lower end of the left radius.

Family History.—Father died of tuberculosis of the lungs; has no knowledge of any members of her family having a tumor.

Past History.—Has always been a healthy woman. Has not suffered from rheumatism.

History of Present Trouble.—About ten weeks ago she was sweeping a wall with a broom and twisted her left wrist backward. The hand was painful, but did not swell much. She noticed the swelling in the lower end of the radius about a week afterward. It has continued to increase in size slowly and continuously since that time. No treatment, except electric, has been used.

Local Examination.—There is a marked swelling occupying the lower end of the left radius. Its upper limit is about 2½ inches above the level of the wrist-joint. The skin over it is slightly dusky and stretched, but there is complete absence of edema. The tumor seems to occupy the whole lower end of the radius. It feels firm, but slightly resilient. There is no egg-shell crackling on moderate pressure. The radial artery can be felt in front. The tendons on the back of the wrist are apparently not implicated. The movements of the fingers and thumb are unimpeded. Flexion and extension at the wrist-joint have about half the normal range. Pronation is almost lost. There is no pain on movement.

General Physical Condition.—This was excellent. The patient was well nourished and appeared to be in robust health. The heart and lungs were normal. The *urine* showed specific gravity 1023; faint trace of albumin; no sugar; no casts; a few squamous and cuboidal epithelial cells. The Bence-Jones reaction was not taken. The blood showed 4,280,000 red cells; 11,000 white cells; 81 per cent. of hemoglobin.

The *x*-ray pictures (Fig. 546) showed that the lower end of the radius was occupied by a growth which had replaced completely the original bony structure. On its lateral aspect the capsule of the tumor showed marked loculations. There was no evidence of bone formation or calcareous deposits in its substance. The capsule was not very clearly outlined except in a few spots. The line of demarcation between the shaft of the radius and the growth was irregular, but abrupt and clear cut. The cartilaginous end of the bone was apparently

intact. The whole tumor was more opaque to the rays than one usually finds in myelomata, yet the absence of bony trabeculæ in its substance favored such a conclusion.

Diagnosis.—Myeloma (benign giant-celled tumor).

Operation.—This was performed on February 7, 1922 under general anesthesia. Bleeding was controlled by a tourniquet.

Fig. 546. Fig. 547.

Fig. 546.—An *x*-ray picture of the myeloma of the lower end of the radius in Case I (bone tumors). The description is in the text.

Fig. 547.—The same case as Fig. 546, taken four months after thorough removal of the tumor by curetment. Ossification is well advanced both in the capsular wall and in its cavity. The capsule has crumpled up considerably and the hand is in the abducted position.

The bone was approached from its anterolateral aspect along the mesial border of the brachioradialis muscle and lateral to the radial artery. The radial artery and the flexor tendons were retracted mesially. The brachioradialis was separated from the tumor and thrown upward. The pronator quadratus

was peeled for a short distance from the front of the tumor. A trap-door opening was made through the capsule. The tumor was then removed completely with sharp spoons. This stage of the operation was somewhat tedious because the inner surface of the capsule was not smooth and there were many recesses which were difficult to empty. The lower end of the radial shaft did not clean as smoothly as usual. The wound was closed in layers without drainage. The tourniquet was removed after a massive dressing and splint had been applied. Healing was by first intention with an afebrile temperature curve.

Since the operation the case has been kept under careful observation. Slight abduction of the wrist has resulted from the crumpling up of the bony shell of the radius. Movements are free and there is complete absence of pain and discomfort. The *x*-ray picture (Fig. 547), taken four months after the operation, shows dense bony formation in the capsule. Consolidation seems to be progressing very rapidly.

Pathologic Report.—The tumor tissue consists of areas of typical "myeloma" in which large giant-cells of the epulis type can be seen in great numbers, with round cells similar to those found in bone-marrow scattered between. These areas form less than half the bulk of the tumor. Intermingled with these areas there are others in which the giant-cells are more numerous, of smaller size, and more irregular shape. Here the interstitial tissue is made up of spindle-shaped cells with numerous reticulated fibrils, which are suggestive of the changes occurring in the reticular tissue of lymph-nodes which have been the site of a long-standing fibrosis. The cells in these areas (Fig. 548, *G*) are somewhat like sarcoma-cells, but irregular and numerous mitoses are absent, both in the giant- and interstitial cells. Mingled with such areas there are some in which almost pure fibrous tissue is present, and still others in which the picture is that of young granulation tissue. Some remnants of fat cells are present imparting a resemblance to reticulated structure and a few areas of lipoid containing foam cells. With the exception of some areas which appear to have resulted from traumatic hemorrhages, all the blood is enclosed in capillaries. Decalcified

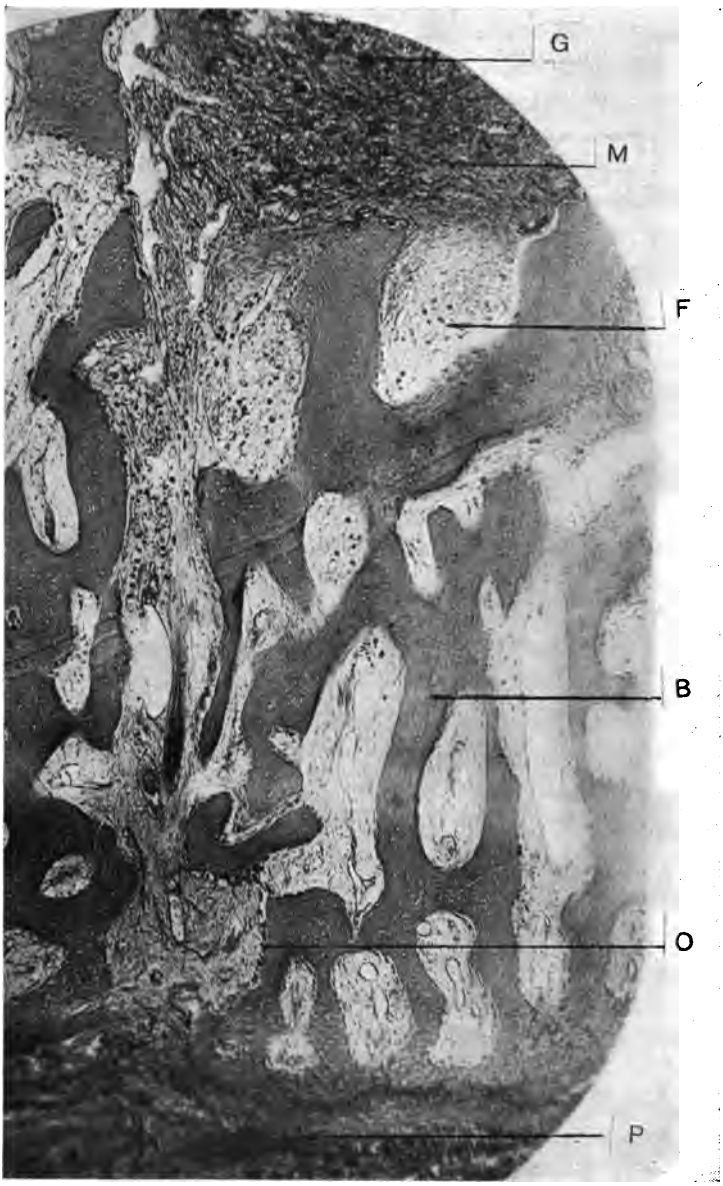

Fig. 548.—Low-power photomicrograph of the bony shell of the myeloma shown in Fig. 546. *M* represents the tumor, in which *G* points to a giant-cell. *P* is the periosteum. *B* is a bone trabecula. *O* are osteoblasts. *F* is loose connective tissue between the bone trabeculæ. For minute description see text.

sections of the bony shell (Fig. 548) show an inner zone of myelomatous tissue bordered by growing bone, the trabeculæ of which present an almost unbroken row of normal looking osteoblasts. The bone-cells themselves stain well and appear normal. There is no sign of any degenerative process in the bone which abuts against the tumor. This is in rather striking contrast to bone invaded by malignant growths which, so far as we have observed, always shows degenerated trabeculæ where invasion is progressing. The periosteum in all the sections examined is separated from the tumor by a layer of bone. There is a slight amount of round-celled infiltration of an inflammatory nature in the periosteum in some places. The spaces between the bony trabeculæ which should be filled with marrow are occupied by loose fibrous tissue such as is found in low grades of chronic osteoperiostitis. A section of a piece of the pronator quadratus muscle was examined. It showed no changes except those of edema.

Case II.—M. T. L. Female; white; aged twenty-five; admitted to the John Sealy Hospital November 19, 1920.

Diagnosis.—Myeloma of the upper end of the left tibia.

Past History.—Has always been a healthy and well-nourished woman. Was married seven years ago; has one child ten months old; no miscarriages. Four years ago she suffered from a severe attack of inflammatory rheumatism which involved nearly all the joints. Both knees were affected, but the left was apparently no worse than the right. The joints of the left arm were longest in recovering. She was bedridden for three months. Recovery was complete and there has been no return of the original trouble except vague pains in the joints when the weather is damp. She had influenza in November, 1918, during which time she suffered from severe pain in the left knee, but no swelling. Recovery was complete.

Present Trouble.—In December, 1919 she fell over a chair and hurt her left knee. There was considerable swelling and pain which lasted for a few days only. In February, 1920 the left knee gave way suddenly and became greatly swollen.

She was bed-ridden for three weeks. On getting up she found that she was unable to walk without crutches, and has used them ever since. For the past three or four weeks she has been confined to bed and the swelling has become greatly reduced in size.

Local Examination.—Showed a swelling occupying the upper end of the left tibia. The cavity of the knee-joint was not encroached upon. There was no synovial effusion. The swelling was globular in shape, regular in outline, and resistant to the touch on deep pressure. The bony walls bent inward slightly. There was no distinct sensation of egg-shell crackling. It was not particularly tender. The circumference of the leg was increased almost 1 inch. The muscles of the leg and thigh were somewhat wasted from disuse. There was no interference with the circulation of the leg below the tumor.

General Physical Examination.—The patient was quite thin and looked anemic. She said that she had lost considerable weight. Examination of the urine showed specific gravity 1012; reaction slightly alkaline; no albumin; no sugar; the Bence-Jones test negative. The blood examination showed 4,616,000 red cells; 10,600 white cells; 71 per cent. of polymorphonuclear neutrophils; 26 per cent. of lymphocytes; 2 per cent. of large mononuclear cells, and 1 per cent. of transitional forms. The heart and lungs were normal. The *x*-ray pictures of the tumor are shown in Fig. 549, *A*, *B*. They show that the upper end of the tibia is occupied by tissue from which bony elements are almost completely absent. There is a thin layer of bone forming the capsule which can be seen distributed over its whole circumference. The line of demarcation between the lower end of the growth and the shaft of the tibia is clear and abrupt. The cartilaginous plates covering the joint surfaces of the tibia appear to be intact. The fibula is not affected.

From the history and *x*-ray findings we believed that the tumor was of a benign nature, probably a myeloma (benign giant-celled tumor). We advised conservative treatment if at the time of operation the local conditions, such as the consistence of the tumor, its color, relations to bone, and the character of the capsule, justified us in treating it locally.

Operation.—On November 21st under a general anesthetic, with permission to amputate the leg if found advisable, the growth was explored. Bleeding was controlled by a tourniquet. The bony capsule was incised and the tumor scooped out. The inner surface of the capsule consisted of a thin layer of white firm bone from which the tumor peeled easily, leaving a clean smooth surface which was free from any particle of tissue clinging to it. It cleaned as smoothly as boiled chicken

Fig. 549.—*A* is an anteroposterior *x*-ray picture of the myeloma of the upper end of the tibia in Case II (bone tumors). *B* is a profile view. For description see text.

bone. The upper end of the shaft of the tibia showed the same smooth eburnated surface. The wound was closed without drainage, carefully sutured, and the tourniquet removed. No external bleeding occurred, but the cavity filled with blood. Convalescence was afebrile and painless. The wound healed by first intention.

Postoperative Course.—For six months the patient used crutches and put no direct weight on the leg. At the end of

this time she was allowed to walk with the aid of a cane or crutch. The upper end of the bone crumpled up somewhat from pressure. *x*-Ray pictures were taken at intervals of a few months and the deposit of bone in the cavity was progressive. The picture shown in Fig. 550, which was taken eleven months after the operation, shows abundance of new bone.

Fig. 550.—The same tibia shown in Fig. 549. The *x*-ray picture was taken eleven months after the removal of the growth by curetment. Note the dense bony consolidation of the capsule; also the crumpling up of the portion of tibia in contact with internal condyle of femur.

Pathologic Report.—The sections of this tumor, shown in Figs. 551 and 552, resemble closely those of Case I. There is more edema of the areas, resembling granulation tissue, and the persistent fat cells are more numerous. No foam cells are present. Small hemorrhages both recent and old are present throughout the sections. Many are in process of organization.

There are a few collections of lymphocytes. Blood pigment both intra- and extracellular is present in several areas. In one region where it is particularly abundant there is a rather large organizing blood-clot, half surrounded by a fairly closed chain of giant-cells. These do not differ from the giant-cells in the other part of the tumor, except that their cell walls are

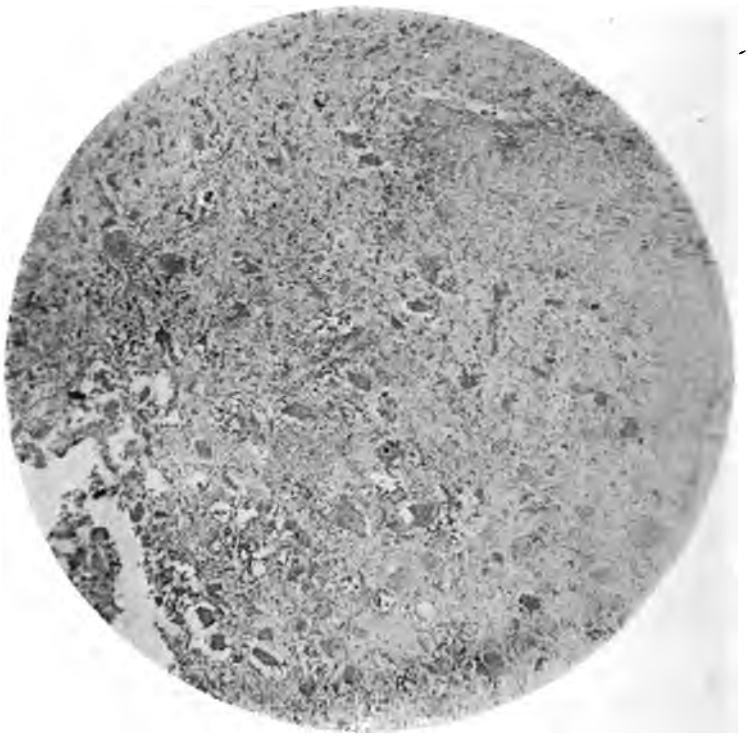

Fig. 551.—Low-power photomicrograph of the myeloma shown in Fig. 549. The giant-cells are very numerous. See text.

imperfectly defined. They appear to blend with the fibroblasts of the granulation tissue which are invading the clot. Here, as in other parts of this tumor, in contrast with the two other myelomata described (Cases I and III) the giant-cells contain a few definite cell inclusions, such as whole or fragmented red blood-cells, pigment granules, irregular basophilic bodies,

and in a few cases vacuoles which may have contained fat. These cell inclusions were not a noticeable feature. They were observed only after prolonged study, and are mentioned solely on account of the controversy regarding the origin of the "epulis

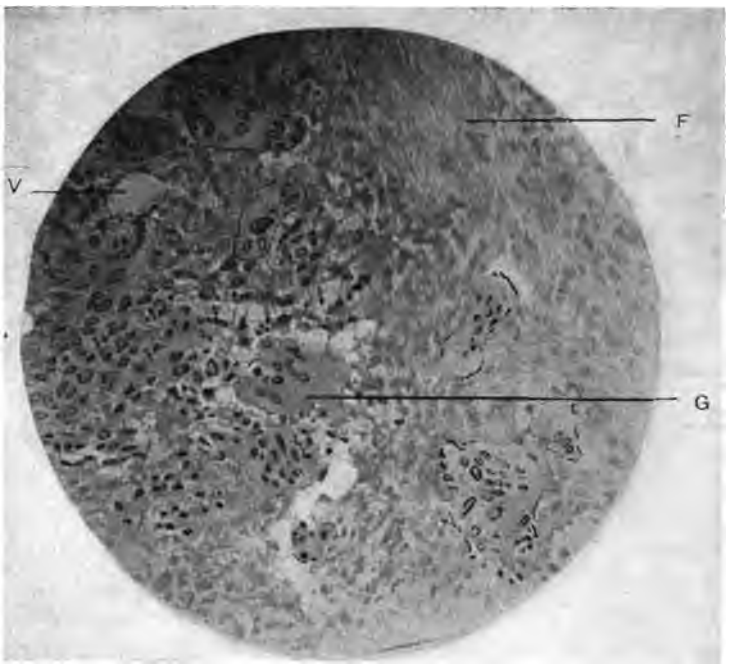

Fig. 552.—High-power photomicrograph of specimen shown in Fig. 551. A number of giant- and interstitial cells have been outlined with ink to emphasize their arrangement and shapes: *G*, A giant-cell; *F*, young fibrous tissue; *V*, capillary blood-vessel.

type" of giant-cells. In all other respects the giant-cells were similar to those found in the specimen previously described.

Diagnosis.—Myeloma (benign giant-celled tumor).

Case III.—F. G. Male, colored, aged eighteen; admitted to the John Sealy Hospital on November 25, 1919.

Diagnosis.—Myeloma of the lower end of the right femur.

Family History.—Nothing of importance could be gleaned;

says he thinks his father died of tuberculosis of the lungs fourteen years ago.

Previous History.—No venereal history. He first noticed a painful spot on the inner side of the internal condyle of the femur in the fall of 1917; believes that it resulted from a fall on the leg. The swelling made its first appearance about Christmas time. In spite of the pain and swelling he continued to work until the fall of 1918, when he contracted influenza. The leg became much worse and the muscles got so weak that he was unable to walk on it. During this time there was practically no pain in the knee.

Present Condition.—(*a*) *Physical Examination.*—The patient was fairly well nourished. The heart and lungs were all right. The urine had a specific gravity of 1011; reaction alkaline, no albumin and no sugar; microscopic examination showed crystals of triple phosphates and carbonates. Bence-Jones reaction was not taken.

(*b*) *Local Examination.*—There is a large swelling occupying the lower end of the right femur the circumference of which is greatly increased over the normal. The swelling bulges more on the inner side of the limb. The knee is slightly flexed and the movements are greatly limited. The outline of the mass is fairly even. It feels uniformly hard, but there are a few soft areas in it. No egg-shell crackling could be elicited. Pulsation is absent. The skin over the swelling is of normal texture and is not adherent to the swelling. The inguinal glands are easily palpable, but not larger than usual.

The *x*-ray report was osteosarcoma. Unfortunately, no detailed description is available and the *x*-ray plates have not been preserved.

Operation.—On December 3, 1919, under the impression that the tumor was a sarcoma, a circular amputation was made at the level of the middle of the thigh. The convalescence was smooth and uneventful.

Fortunately the pathologic specimen and a plaster cast of the leg and thigh are preserved in the museum of surgical pathology. The bottled specimen, a photograph of which is

shown in Fig. 553, shows all the typical features of a myeloma.

Gross Pathology.—The surface of the section shows the characteristic firm, brittle consistence and usual dark maroon

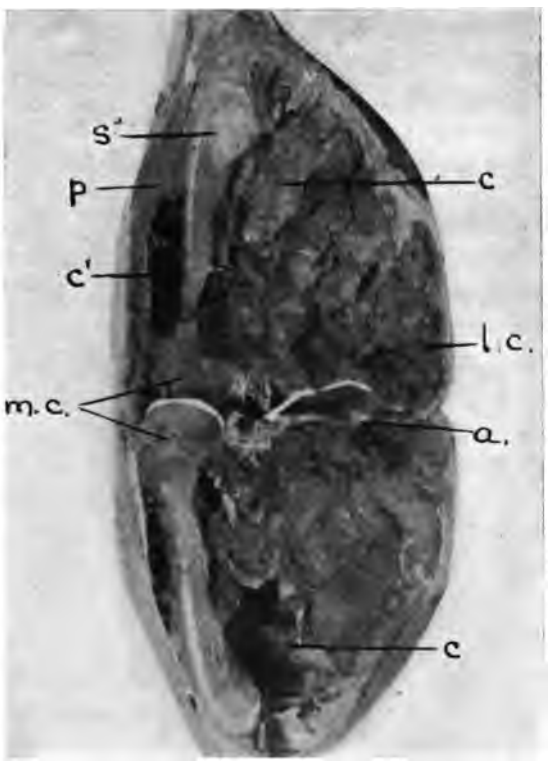

Fig. 553.—Photograph of preserved museum specimen of the myeloma of the lower end of the femur in Case III (bone tumors). The section is coronal. Both sides of the specimen are shown. They are hinged at the knee-joint. For description see text. *a*, Articular cartilage; *c*, cyst in tumor; *c'*, cyst between periosteal capsule; *p* and *s*, shaft; *l.c.*, lateral condyle; *m.c.*, medial condyle.

color. The brighter colors, such as the pinks and yellows, have faded to a dull brown. A few whitish-yellow gelatinous patches are scattered about. One large cystic cavity occupies the upper pole of the tumor. Part of its wall is formed by the eroded

shaft of the femur. Another cystic cavity is present between the medial surface of the shaft of the femur and a thin capsule of bone developed in the periosteal sheath, which in this situation has been lifted off the shaft by the extension of the tumor around it. This cystic cavity is divided into compartments by bony trabeculæ. The main mass of the tumor occupies

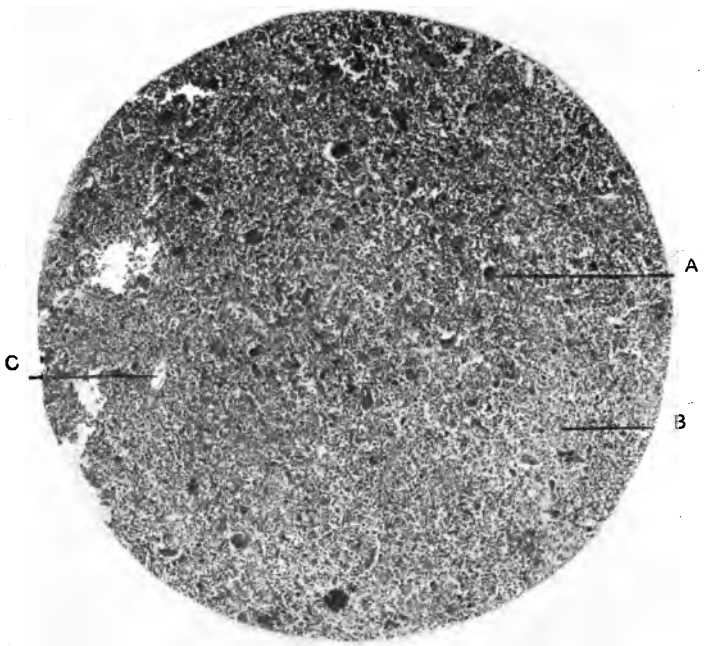

Fig. 554.—Low-power photomicrograph of the tumor shown in Fig. 553: *A*, Giant-cell; *B*, round-cells, chiefly myelocytes; *C*, capillary. For full description see text.

the site of the lateral condyle which it has destroyed and replaced. It extends up the thigh for a distance of 15 cm. It is completely encapsulated. The capsule consists of thick condensed fibrous tissue infiltrated over the greater part of its extent with lime salts and true bone. It blends with the periosteum above, and with the margins of the cartilage covering

the lateral condyle below. On the inner side, where the growth has surrounded the remains of the shaft of the femur, the capsule consists of detached ossified periosteum. The internal (medial) condyle is invaded to a slight extent only. It is continuous with the shaft of the femur by a strong bar of bone which represents the inner portion of the original shaft. The periosteum has been separated from the inner surface of the bar over a considerable area to form one of the cystic cavities mentioned previously. The outer surface of the bar is in contact with the main tumor mass. It is deeply and irregularly eroded by the growth, but the line of demarcation between the bone and tumor is clear, distinct, and abrupt. To the naked eye there is no appearance of infiltration. The growth can be separated from the bone with facility. The cartilage of the lateral condyle is intact everywhere.

Pathologic Report.—The tumor (Fig. 554) consists of irregularly rounded cells with neutrophilic cytoplasm, and single rather pale resting nuclei, of round, oval, or, in a few instances, of irregular shape. Some are horseshoe shaped, similar to the nuclei of of transitional cells. A few show evidence of recent mitosis. Most of the cells correspond in size and staining properties with myelocytes, but they are more irregular in outline. A very few cells resembling normoblasts are present, and a few lymphocytes and polymorphonuclear leukocytes. No eosinophilic leukocytes are present. Isolated erythrocytes are scattered between the cells as in normal marrow. Giant-cells are present throughout the tissue. In some areas they are so numerous that they almost touch one another; in other areas they are separated by a considerable interval. They vary greatly in size. There are a few which are circular in section, but the majority show irregular cytoplasmic processes, which frequently extend for a considerable distance from the cell body. The nuclei, with but few exceptions, are in the resting stage. They are round or oval, and vary greatly in numbers. In the cross-section of one or two of the larger cells as many as 35 nuclei were counted. Many contain only 5 or 6. This variation is doubtless largely the result of section, as is also the similar variation in the size of the giant-

cells. The nuclei are in all cases scattered over practically the whole of the cell mass. They tend to concentrate in the interior rather than on the periphery. The cells nowhere show the central anuclear area of the usual tuberculous giant-cell. This nuclear arrangement is similar to that customary in certain other types of foreign body giant-cell (*e. g.*, actinomycosis), and is not an indication for or against the foreign body origin of these cells. There is, however, no indication that the giant-cells tend to be grouped about hemorrhagic or serous exudate in the tumor or about bony débris. They are so numerous and so widely distributed that they appear to be an integral part of the tumor growth. Throughout the growth the cells are held together by delicate strands of reticular connective tissue. Blood capillaries traverse it at frequent intervals. They are not invaded by tumor-cells. In a few areas there are trabeculæ of young fibrous tissue. There are some areas of recent and old hemorrhage, but no deposits of blood pigment visible in the surrounding cells. No sections of the walls of the larger cysts containing serosanguineous fluid were made. No foam cells were found. The marrow in the shaft of the femur above the tumor was normal. A greatly enlarged popliteal gland showed lymphoid hyperplasis only.

Diagnosis.—Myeloma (benign giant-celled tumor).

Postoperative History.—The patient was discharged from the hospital after the amputation wound had healed completely. We have been unable to follow his case.

Remarks.—The pathologic specimen has been examined with unusual care from every point of view, and in the light of our postoperative knowledge we feel convinced that amputation was unnecessary. We believe that the growth could have been shelled out of its capsule, which could have been left intact after thorough curetment and cleansing. Thorough removal of the portion of the growth extending around the shaft of the femur would have been difficult, but quite feasible. The popliteal vessels and nerves were quite out of harm's way because they were situated behind the tumor. Two vertical incisions, one over the lateral condyle and the other over the medial condyle would probably have given good access to the tumor. Through

a trap-door in the capsule on the lateral aspect the greater part of the tumor could have been cureted out. Through the inner incision the growth encircling the shaft could have been removed. The portion of femur stretching between the medial condyle and the upper part of the shaft is fairly strong and massive. It is almost thick enough to sustain the weight of the body unaided. The increase in the size of the femur which would have followed the collapse of the capsule and the subsequent ossification of its walls would have added strength enough to allow the patient to walk without danger of breaking it.

Case IV.—Sarcoma arising from the central part of the lower end of the diaphysis of the femur; mixed-cell type of very malignant appearance; amputation through the shaft of the femur; patient alive and well six years after the operation.

R. M. Male; white, aged eleven years; was admitted to the John Sealy Hospital on April 6, 1916.

Family and *personal histories* were unimportant.

History of the Complaint.—The trouble began three and a half months ago with pain in the right knee-joint. Movements became painful and very soon the joint became stiff, and he was unable to walk. A history of injury to the joint is very doubtful.

Present Condition.—The leg was flexed, immobile, and greatly swollen. The patient was thin, anemic, and emaciated. His father and 2 of his brothers, who had accompanied him from home, were also very thin and anemic. I requested an examination of the stools of all the family. Hookworm was found in all, including the patient. The urine was normal. There is no *x*-ray report, nor can the *x*-ray picture be found.

Operation.—The thigh was amputated April 8, 1916, the femur being divided below the trochanters. Convalescence was uneventful. The patient left the hospital on April 15th.

The history is, unfortunately, very incomplete, but happily we are able to strengthen it by an examination of a plaster cast of the tumor before amputation and by a careful scrutiny of the tumor which has been preserved.

The plaster cast shows an accurate mold of the tumor. The

swelling occupies the region of the medial condyle and the shaft just above it. There is no bulging on the inner side of the patella. The joint cavity is not distended. There is evidence of wasting of the calf muscles. The joint is semiflexed.

Gross Pathology.—The tumor is in an excellent state of preservation. It is shown in coronal section in Fig. 555, which is a photograph of the mounted specimen. It occupies the central part of the diaphysis of the femur just above the epiphysela

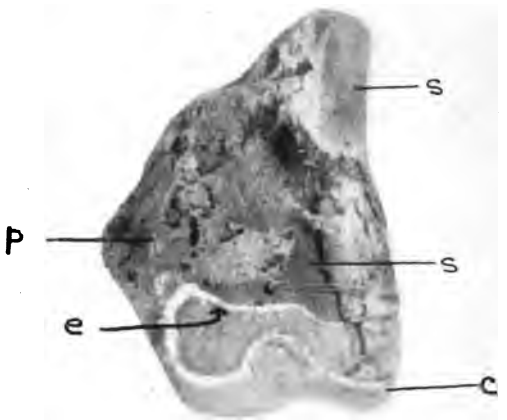

Fig. 555.—Photograph of preserved museum specimen of the osteogenetic sarcoma of the lower end of the femur in Case IV (bone tumors). One-half of a coronal section through the knee-joint is shown: *s*, Shaft; *e*, epiphyseal line; *c*, external condyle; *p*, periosteum. For full description see text.

cartilage separating it from the medial condyle. The medial portion of the shaft is completely replaced by tumor which extends upward for a distance of 10 cm. In the medial part of the tumor the line of the original shaft is shown by a slightly curved vertical white streak which apparently represents the original periosteal sheath. The main part of the growth is inside the periosteal sheath, but a considerable amount has penetrated through it and infiltrated the surrounding soft tissues. This extraperiosteal growth seems to have spread around the lower

end of the femur, for it can be seen clinging to the surface of bone on the opposite side of the specimen. The growth is of dark gray color, looks somewhat friable, and shows many cystic spaces which once contained blood. The line of demarcation between the growth and healthy bone is not very distinctly defined. The lower epiphysis of the femur is not invaded by the growth.

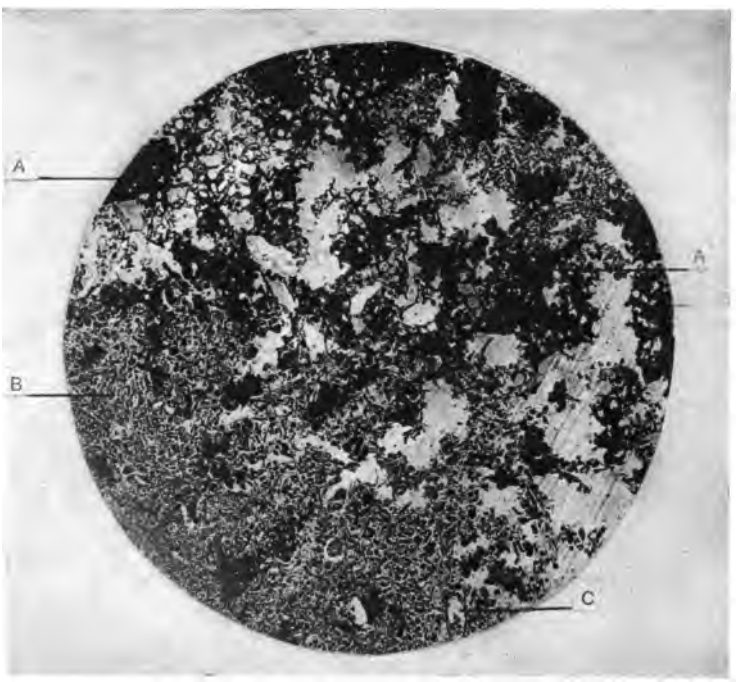

Fig. 556.—Low-power photomicrograph of the tumor shown in Fig. 555: *A*, Calcified osteoid trabeculæ; *B*, mass of tumor-cells; *C*, capillary blood-vessels. See text.

Microscopic Report—The microscopic sections of the interior of the tumor show cells of varying size and shape (Figs. 556, 557). A small number of them are round in section, but the majority are polyhedral. The irregular mixture of every cell type is the most noticeable feature. In size they vary from that of a leukocyte to six or seven times as large. Many of the larger cells contain one large nucleus or several smaller ones. These are

giant-cells of the usual irregular type produced by atypical mitosis. There are no giant-cells of the myeloplax type to be seen. A few were found which slightly resembled osteoclasts, but they were smaller than usual. Between the cells there is a network of acellular material forming alveolar spaces in the

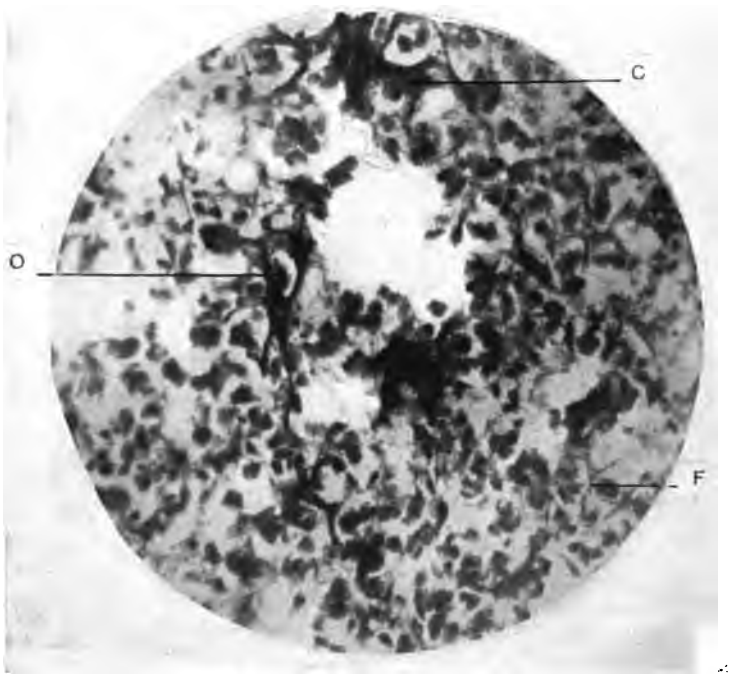

Fig. 557.—High-power photomicrograph of the same specimen shown in Fig. 556: *C*, Calcified osseous trabecula; *O*, tumor-cell in calcified mesh; *F*, fibrillar network between cells. See text.

meshes of which giant-cells were isolated. The structure is rendered still more complex by the presence of many short loose fibrils and granular intercellular substance which stains with eosin. In every field there are areas in which the network is densely calcified. For the most part the calcified trabeculæ are delicate, irregularly spaced, and enlcose many cells in their

loculi. In a few spots they are wider, better consolidated, and enclose single cells. Here the arrangement resembles slightly that of normal cancellous bone. A few isolated red blood-cells are present in the tissues. No true blood-vessels are present, but there are some channels serving as blood spaces which are surrounded by tumor cells. In a few of these the endothelial lining appears to be intact.

The structure is that of a highly malignant osteoblastic sarcoma of osteogenetic origin.

After-history.—The patient has been in excellent health since he left the hospital. I received a letter from him in July, 1922, in which he stated that his health was perfect, and that there was no sign of diease in any part of his body. He is able to walk on an artificial leg and is attending school regularly.

The case is of unusual interest because it is an example of a cure following amputation for a very malignant type of osteogenetic sarcoma of the shaft of the femur.

In the last sentence of the pathologic report on the microscopic appearance of the tumor we used the expression "highly malignant osteoblastic sarcoma of osteogenetic origin." In so doing we have taken the liberty of trying to simplify the nomenclature of bone tumors and to employ words that are already used universally in the description of pathologic processes in the soft parts.

Sarcomata arising from cellular elements that are physiologically differentiated for the purpose of forming bone are spoken of as osteogenic or osteogenetic. Considerable confusion in nomenclature has arisen from the use of the terms incorrectly. Osteogenic and osteogenetic ought to mean the same thing, *i. e.*, arising from bone elements. From its analogy with branchiogenetic we prefer the latter term. Unfortunately, some writers use the term osteogenetic as synonymous with bone producing. This is an incorrect usage, because such a meaning is completely at variance with the meaning of the Greek root γεννητός, which signifies "begotten" or "born." The word "osteoblastic" signifies having the quality of forming bone, just as the analogous word "fibroblastic" signifies the power of forming fibrous tissue.

An osteogenetic sarcoma, then, is a malignant growth which arises from bone-producing cells; whereas an osteoblastic growth is one in which bone is being manufactured.

It is evident that the tendency of most osteogenetic growths is to produce bone in some part of the tumor, because the cells of which it is composed have osteoblastic tendencies.

An osteogenetic sarcoma is rarely free from bony foci. Sometimes they are few in number, scattered sparsely through the tumor. At others they are very numerous and minute, giving a gritty sensation when the tumor is cut; and at others the growth of bone may be excessive, causing the tumor to feel like a hard bony mass. The deposition of bone frequently occurs in needle-like rods arranged at right angles to the axis of the bone like the bristles in test-tube brushes. Macerated specimens of such tumors show a complete skeleton of the tumor.

Osteoblastic formations, also, in the great majority of cases result from the physiologic activity of osteogenetic elements. Consequently, osteochondromata, osteomata, osseous nodes, and callus are all osteoblastic formations. Nevertheless, we must not forget that bone formation may be the result of a metaplasia as seen in myositis ossificans, in lymph-nodes, in the bony plates found occasionally in the dura mater and brain, in the chorioid coat of the eye, and in bony tumors occasionally met with in glandular organs such as the breast.

The cellular elements from which osteogenetic sarcomata may arise are present in the periosteum, in the bone, and to a less degree in the marrow cavity. Young marrow is very rich in osteoblastic cells. When the bone ceases to grow the osteoblastic elements disappear from the marrow almost completely. The marrow is also very rich in cells actively engaged in forming the cellular elements of the blood, both red and white cells. From these cells, particularly from the lymphocytic cells, tumors of a malignant nature may arise. They are usually round-celled sarcomata of a very malignant type, and they frequently make their appearance in several bones of the body simultaneously.

Tumors arising from angeio- and lymphoblastic elements ought never to be grouped with the osteogenetic growths.

CONTRIBUTION BY DR. ARTHUR C. SCOTT, SR.

SCOTT AND WHITE HOSPITAL, TEMPLE, TEXAS

CAUTERY DISSECTIONS FOR METASTATIC CANCER

CONTAMINATION of wounds with cancer cells during the progress of surgical operations for excision of cancerous masses has always furnished a problem with which it was difficult to deal because the exact outlines of cancerous invasion cannot with precision be determined. Neither can anyone determine the extent to which reinfection or increased metastasis takes place when cancerous tissues are cut into and otherwise disturbed by the surgeon's knife, forceps, and gauze sponges.

In susceptible subjects with freshly opened and exposed capillaries and lymphatics no one can say that such patients are safe from reinoculation with the very disease for the cure of which operation was performed if the surgeon has accidently contaminated either instruments, sponges, or gloves, though he may have consistently observed the most commonly approved surgical technic.

Careful surgeons take great pains to avoid cutting into cancerous masses, and promptly change knives if it is discovered to have been accidently done; but it is rare indeed to see a surgeon take any unusual precautions to avoid persistence of or spreading the disease when cutting or tearing into lymphatic chains and nodes during a dissection of metastasized cancerous glands in the neck, axilla, or groin.

When one considers the subject with all the facts in mind it is difficult to justify the knife and gauze sponge dissections so commonly practised, and we should not be at all surprised when we observe that comparatively few permanent recoveries follow removal of cancers from any region of the body where a definite

involvement of neighboring lymphatic glands is found and the tissues are removed by the usual knife and gauze dissections.

It must be admitted that lymph chains may carry the specific cause of cancer from the original growth to some neighboring gland without any recognizable cancer lesion in the intervening tissues, but no means is available to determine whether the specific organism is, at the time of the operation, occupying a part or all of the connecting lymph vessels. During any routine dissection for the removal of cancerous lymph vessels and glands it is utterly impossible to avoid cutting into and otherwise traumatizing them; so it is exceedingly difficult and often impossible to avoid contamination of a fresh wound when the usual surgical technic is followed.

In a consistent endeavor to remove cancerous disease without leaving a contaminated wound during the last thirteen years we have accumulated records of more than 500 cases, 400 of which have been reported, in which radical excisions were done with cautery. All excisions of cancerous masses in this group were done without the use of the knife and, doubtless, several of our earlier cases which failed to recover should have had the benefit of lymph-gland dissections with the cautery.

After much experience with the electric cautery we found that it was both desirable and feasible to carry on the surgical procedure for removal of neighboring metastatic glands with the electric cautery in the same manner as is usually done with the knife. This may be done with an equal degree of thoroughness without danger of leaving a wound contaminated with live cancer cells or other organisms.

For obvious reasons some modifications of technic are necessary to accomplish thorough work with safety from a red-hot instrument. During the gradual development of our technic we learned with astonishment that skin and subcutaneous tissues severed rapidly with a white-hot cautery will, when sutured, unite primarily with a readiness only a little short of that following knife incision. It has been equally as astonishing to observe that a cherry-red cautery can be used for peeling off the carotid sheath and cancerous tissue in contact with the deep

jugular vein and carotid arteries without the slightest discernible damage to these vessels.

For about six years we were doing cautery excisions of superficial cancer masses, often including the destruction of contiguous bone, by cooking with the cautery before we ever attempted to remove cancerous lymph-glands by means of this instrument.

Seven years ago last March, while doing a cautery excision of the parotid gland for cancer of the temple and cheek, we observed a large cancerous lymph-gland just beneath the lower margin of the parotid. It was somewhat inaccessible, but with the cautery we enlarged the wound downward along the anterior margin of the sternomastoid muscle and found that by lifting the gland with thumb forceps we could easily burn through the loose areolar tissue and fascia which held it. Then two or three more smaller glands came into view, and, after further extension of the skin incision, they were likewise removed, together with some of the deep cervical fascia and gland-bearing fat. This left exposed about 7 or 8 cm. of the deep jugular vein and carotid arteries.

Prior to that time all cautery wounds were left open to heal by granulation, but to cover the large exposed vessels in this case the skin edges were drawn together with silkworm-gut sutures.

Having incised the skin with the cautery we met our first astonishment when primary union of the sutured part of the wound took place. The next surprise came when later we found that the patient, whose carcinoma was of the squamous cell variety, remained well. The patient is still free from recurrence at the end of seven and a half years.

We have since that time done 52 glandular dissections for carcinoma with the cautery, and each year marks an increase of our confidence in this procedure and a further improvement in technic.

The dissections so far comprise 36 cases of lymph-glands of the neck, 12 of the axilla, 3 of Scarpa's triangle and inguinal region, and 1 limited dissection in the pelvis in the triangle between the internal iliac vein, the bladder, and ureter.

Such dissections, of course, require complete removal of all gland-bearing fat in the region involved whether there is much or little enlargement of the lymph-glands.

It is our custom to begin dissection at the most remote point from the primary lesion and carry the dissection of the fascia *en mass* up to the neighborhood of the primary lesion which may properly be removed by excision with the cautery either before or after the gland dissection is made. In cancer of the tongue it is sometimes desirable, in very feeble subjects, to make the neck dissection two or three weeks in advance of the excision of the tongue.

When the first lymph-glands are exposed, one or more of them are isolated, removed, and sent to the laboratory for microscopic examination by frozen section, and this is repeated at frequent intervals during the progress of the operation. Valuable information is thus often obtained pointing to the probable distribution and limits of the disease.

The technic of lymph-gland dissections with cautery varies somewhat according to the region involved, but the most difficult and interesting is that required in the removal of metastasized cancerous glands of the neck.

When the primary cancer involves the lower part of the face, mouth, and tongue the lymphatics in the anterior triangle of the neck are usually the only ones involved. When the disease is in the temple, behind the mandible, or about the ear both anterior and posterior triangles are likely to be involved, and when located about the scalp or neck posterior to the ear the posterior triangle alone is usually involved.

It will be sufficient to describe the technic of a block dissection applied chiefly to the anterior triangle of the neck.

With the shoulders elevated and the head thrown back, as for a goiter operation, a split towel or sheet is pinned to the lower margin of the chin and the head is then rotated to the opposite side. Gas-oxygen anesthesia without any ether whatever is used. When associated with excisions of the tongue, chloroform is more satisfactory.

The cautery used in our work consists of a flat platinum

loop with beveled edge attached by heavy copper wire to a hard rubber handle and connected by insulated wires to a Downs'

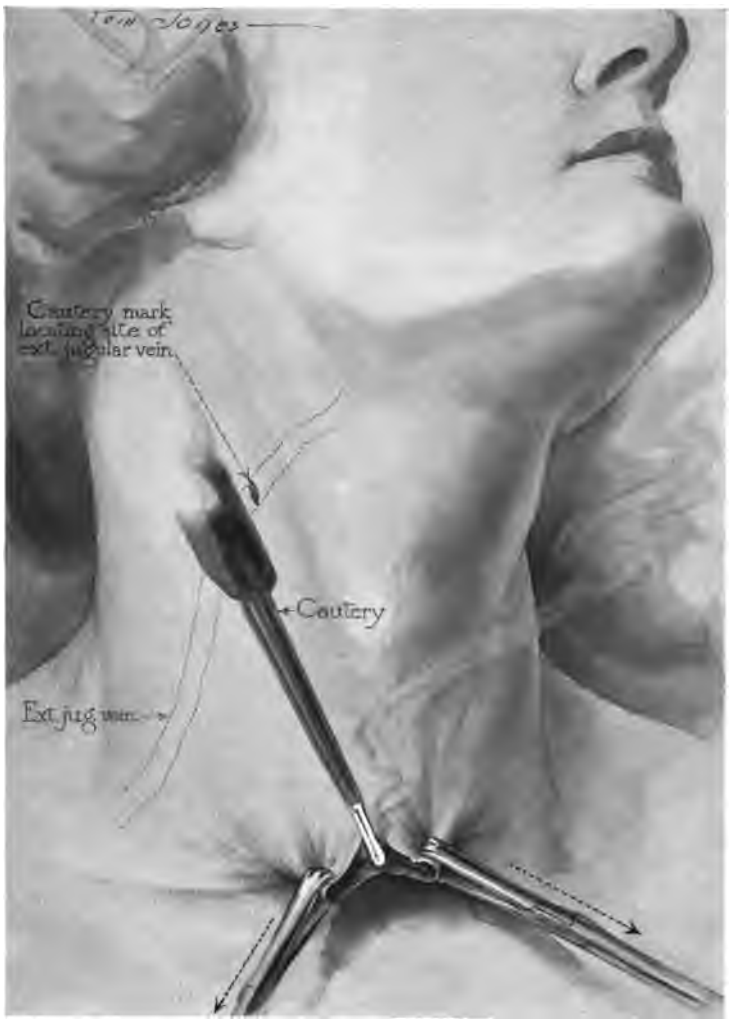

Fig. 558.—All skin incisions are made rapidly with white hot cautery while the skin is held tense with volsellum forceps.

rheostat, which is fastened upon a tall movable stand and then connected with an electric-light current carried upon a No. 8 wire.

One trained assistant, preferably a level-headed nurse, is entrusted with the rheostat, and given a position standing upon a stool, where she may constantly have the cautery tip within plain view while she also continually keeps one hand upon the rheostat control. She is taught just what position on the rheostat is necessary for a white, dark red, or black heat, each of which has a special field of usefulness, with which she must also be familiar.

The position of the anterior border of the sternomastoid muscle is noted, and a mark on the skin is made with the cautery directly over the external jugular vein, 2 cm. behind the point where it crosses the border. This is done to aid in locating and catching the vein before it is severed with the cautery. The skin over the sternomastoid near its insertion at the sternoclavicular joint is grasped and held up with two strong short volsellum forceps. The cautery at a white heat cuts between the two forceps through the skin and superficial fascia 2 cm. behind the anterior border of the sternomastoid muscle. By pulling downward and separating the volsellum forceps the tissues are made tense and rapidly separated as the cautery rips the skin in an upward direction 8 or 10 cm. The skin is again caught near the upper limit of the incision, lifted up, made tense, and widely separated, while it is again ripped by one or two strokes of the white cautery. This procedure is repeated until the mastoid process is reached if the dissection is limited to the anterior triangle, or it extends up into the temple if the parotid gland is to be excised.

Beginning at about the center of the first or main incision another incision is extended upward and forward crossing the midline beneath the symphysis mentis. A third incision 5 or 6 cm. below the mastoid process is run at a right angle posteriorly from the main incision to permit easy retraction of the sternomastoid muscle, exposure of the glands beneath the muscle and immediately behind the internal jugular vein. If the glands along this area are found to be involved in the disease, then another incision is extended backward from the main one about

5 cm. above and parallel with the clavicle, and complete dissection of the posterior triangle also is made.

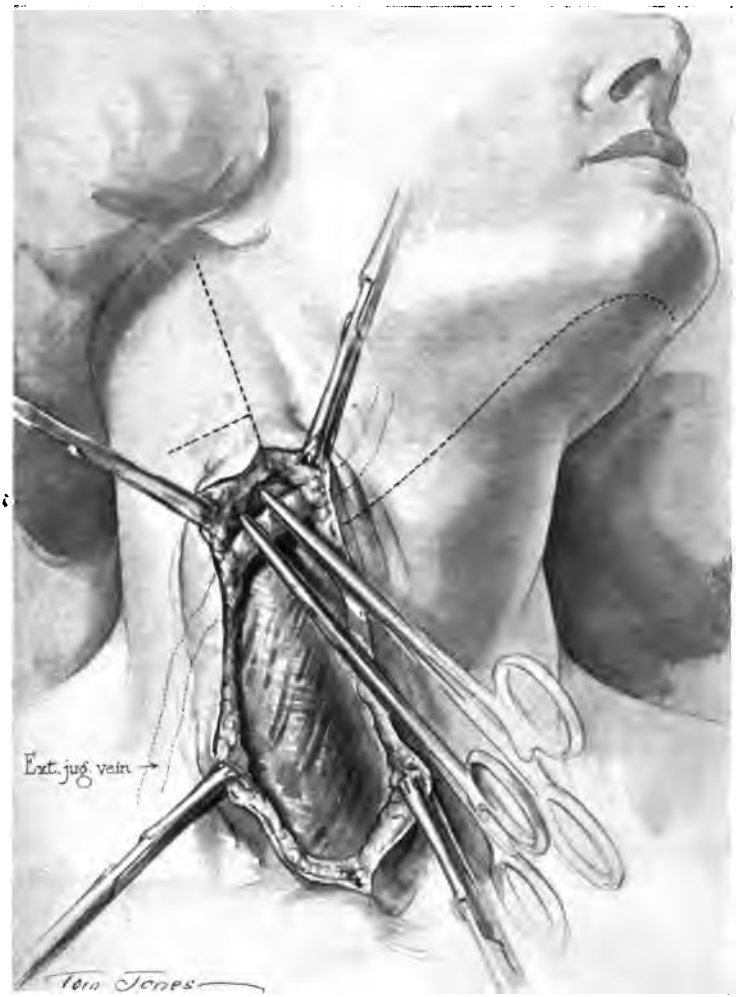

Fig. 559.—The external jugular vein is caught with two forceps, between which it is divided with the cautery. Dotted lines show extension of incision.

When making the main incision the site of the external jugular vein, previously marked, is cautiously approached, and

when within 1 cm. of it the skin edges are caught with two volsellum forceps, lifted up, and turned out, exposing the vein, which is then caught between two mosquito forceps, divided, and ligated; after which the incision is extended up to the mastoid process.

After the skin incisions are completed the cautery is placed at a cherry-red heat, and while firm spreading traction is made the flaps are elevated and reflected forward, backward, and upward by light strokes of the cautery in a manner quite similar to that practised when dissections are made with the knife. Usually the platysma muscle should not be left attached to the skin-flaps, and this should never be done directly over glands that are distinctly enlarged. It should be removed with the gland-bearing fat and fascia.

After all flaps are turned back as far as necessary the deep cervical fascia, including the platysma muscle, is incised over the sternomastoid muscle from the sternum to the mastoid process. The deep fascia is then lifted up by two thumb forceps and carried forward, while at the same time the sternomastoid muscle is retracted backward with sharp retractors until the jugular vein comes into plain view (Fig. 560). Just here the most skilful retraction by assistants and cautious strokes of the cautery are necessary while the carotid sheath is being separated from the vein and artery. When the deep jugular vein is empty it is indistinguishable from the deep cervical fascia and carotid sheath; therefore, firm traction upon the sheath or fascia often renders it invisible by emptying it, and then it becomes necessary for the assistant, who is pulling the sheath forward, to relax it at intervals sufficient to render the vein more visible by permitting it to refill with blood.

The vein and artery having been well exposed and denuded of the sheath in the lower part of the anterior triangle, a block dissection, including all the fascia and gland-bearing fat lying in front of and to the outer side of these vessels, is then carried forward to the midline and upward to the submaxillary triangle. Any diseased glands lying upon or attached to the vein or carotid vessels are separated by continuous gentle traction from below,

upward, and forward, while countertraction is made upon the blood-vessels and the dark red cautery gently sweeps across the

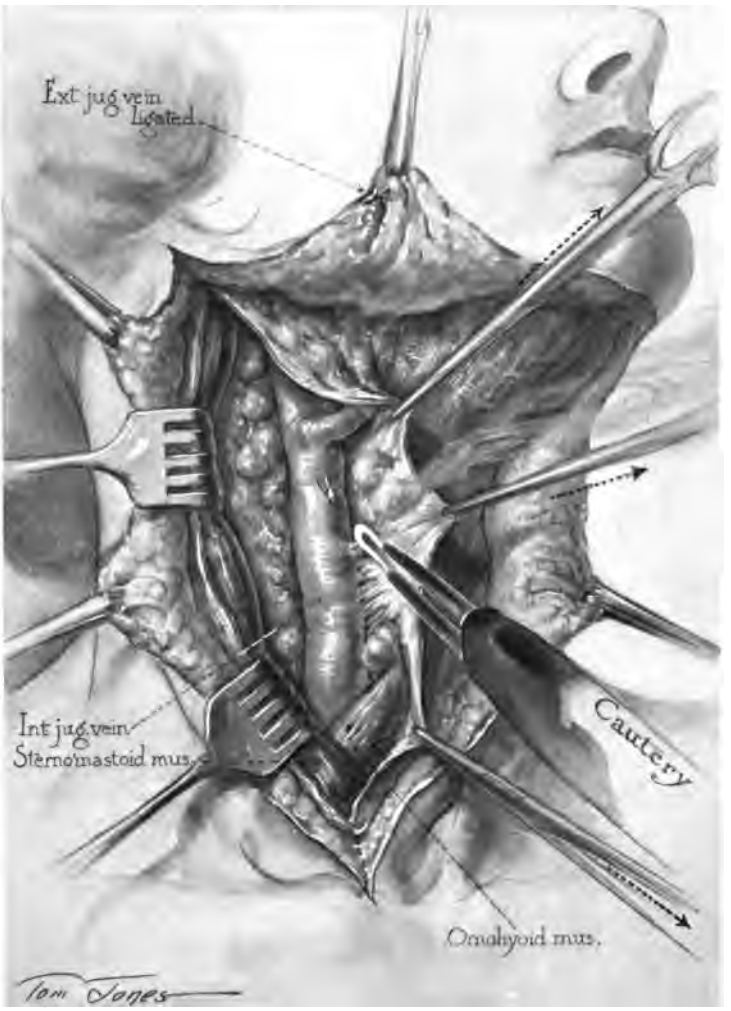

Fig. 560.—The carotid sheath is drawn forward and held tense while its areolar attachments to the vein and artery are gently separated by short light strokes of the dark red cautery.

surface of the glands, loosening areolar attachments and delicate adhesions.

in which the tongue is removed through the mouth after union of all the tissues concerned in the above dissection has taken place.

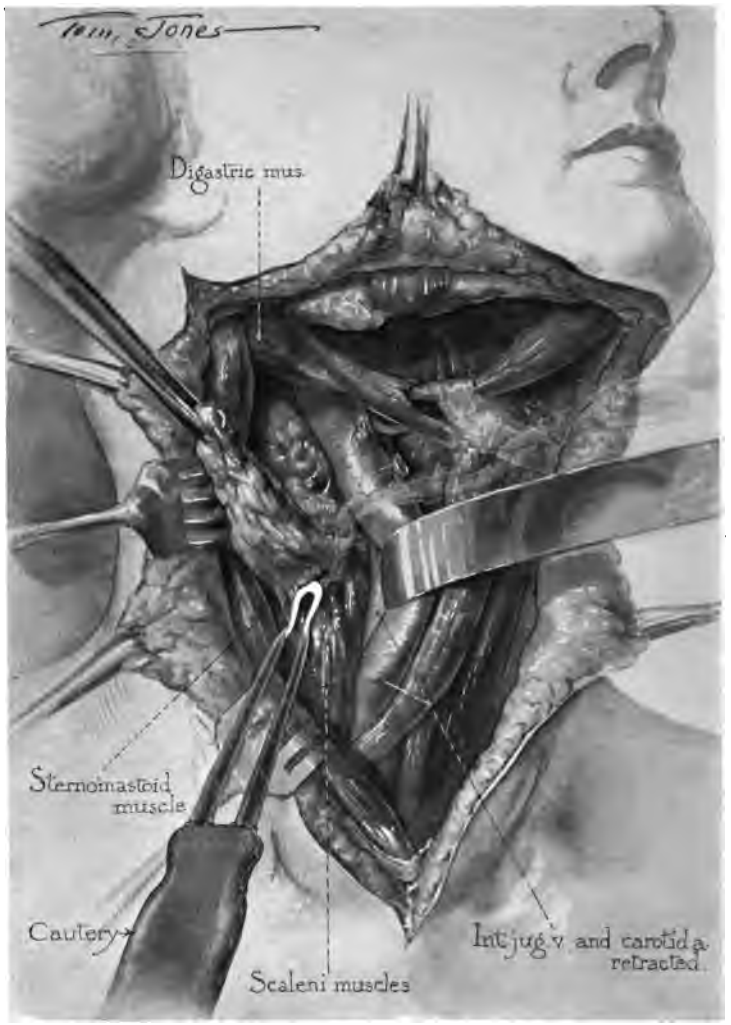

Fig. 562.—By drawing the vessels forward while the sternomastoid is sharply retracted backward much of the posterior triangle can be cleared of fascia through the main incision.

It is well, however, before the wound is closed to ligate one or both lingual arteries.

It is not absolutely necessary but desirable to avoid wounding

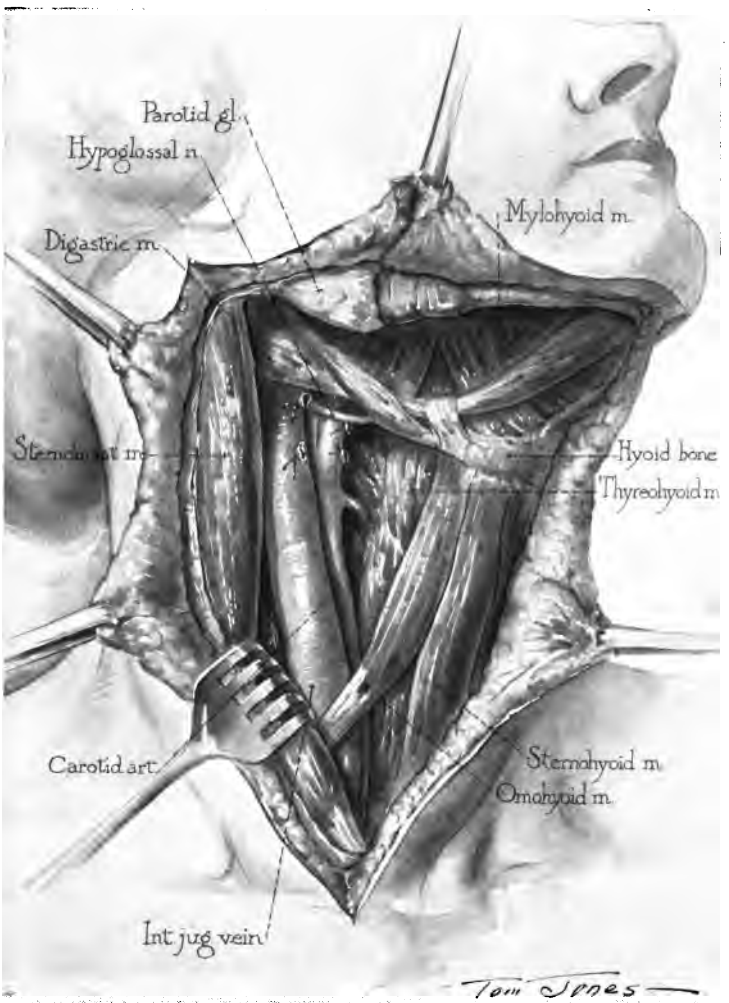

Fig. 563.—Triangles of neck cleaned of all lymph-glands and lymph-bearing fat and fascia ready for closure. It will be noted that the submaxillary gland in this illustration has also been removed, but the parotid has been left intact.

the internal jugular vein, the common and internal carotids, the vagus, superior laryngeal and phrenic nerves. The mortality

Fig. 564.—Case of squamous-cell carcinoma of tongue with metastasis. Cautery excision of tongue and cautery gland dissection. Scar one month after operation. Eighteen months have elapsed without recurrence.

Fig. 565.—Case of squamous-cell carcinoma in front of right ear involving the parotid gland, with metastasis in the cervical glands. Cautery excision and cautery dissection of the parotid gland and cervical glands in superior carotid triangle. Scar at end of two years. Facial paralysis. No recurrence in three and a half years.

may be greatly influenced by accidentally wounding them or by the necessity of severing, ligating, or resecting them.

The skin-flaps are sutured in place with subcutaneous catgut and finished with silkworm-gut. Two small drainage-tubes are inserted and the usual postoperative care is given.

Fig. 566.—Case of squamous-cell carcinoma of temple involving parotid gland. Metastasis in superior carotid triangle. Cautery excision and dissection. Scar at end of six and a half years. Facial paralysis. No recurrence at end of seven and a half years.

These operations are most often done upon very aged patients, and, strange to say, shock is seldom seen. With but few exceptions primary union of the flaps has been obtained.

Two hospital deaths have occurred: one at the end of two weeks from cerebral anemia following ligation of the common carotid which was necessitated by resection of the external carotid close to the bifurcation with the cancerous mass. The

second case died from septic pneumonia one week after operation, probably due to nerve injury, which permitted aspiration of the buccal secretions.

The practicability of using the cautery for making skin incisions is illustrated by the scars shown in Figs. 564–566.

Many of our cases have been operated too recently to warrant an attempt to draw final conclusions, but at some future date we will give an analysis of all our gland dissections done with the cautery and report results in detail.

CLINIC OF DR. K. S. BLACKWELL

MEMORIAL HOSPITAL, RICHMOND, VIRGINIA

CARCINOMA OF THE ANTRUM OF HIGHMORE

THE first case which I wish to present is that of a white woman, fifty-eight years old, who came to me for relief from a severe pain which started in the region of the left antrum and radiated over the entire left side of the face, ending at the occipital region. The pain dated back to about a year ago, but during the past month had become almost unbearable. This pain was lancinating like that of a very severe toothache, though she had no teeth. There was a sensation of fulness over the antrum, the left eye was swollen, with a very dark circle under it.

She stated that she had about ten years previously a "catarrhal affection" of the left side of the nose, the discharge from which was very offensive, especially when she had a cold. This discharge kept up without any pain until about a year ago, when the discharge suddenly stopped, and then the pain began. Her past history was very good with the exception of an attack of influenza which she had three years ago, and since then she has had a slight cough, with a moderate amount of thick yellowish, mucopurulent sputum.

On examination of her nose I found in the region of the middle turbinate a congested and hypertrophied mucous membrane which was covered with a mucosanguineous secretion, but there was seemingly no definite tumor in the middle meatus. On pressure with a probe there followed rather profuse bleeding, and a great deal of pain was experienced every time I touched the middle turbinate bone. Upon transillumination of the antra there showed up a very marked difference between the two sides, the left side being very much darker than the right, and though we know the danger of putting too much dependence

in this sign, still, when there is present a very distinct shadow, we feel that it must be considered. Thinking that there might be some pus present, I punctured the antrum, but found none, though there was a small amount of blood and detritus in the washings. I then had some *x*-ray plates taken which showed very definite evidence of the presence of a tumor in the left

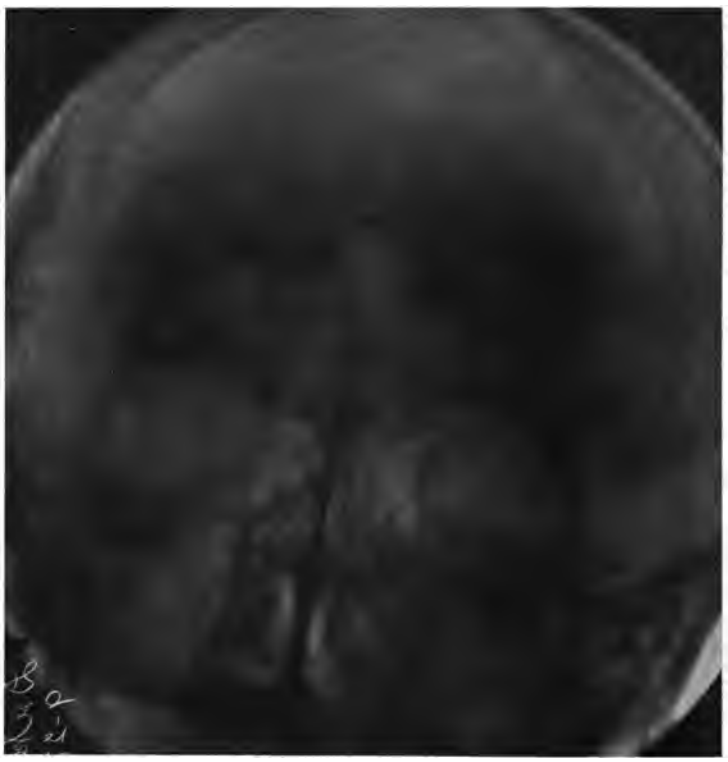

Fig. 567.—*x*-Ray of carcinoma of the left antrum of Highmore. Anterior view.

antrum (Figs. 567, 568). I at first applied radium, sticking the needles well up under the middle turbinate and letting them project into the antrum, where the tumor appeared to be. This application did not seem to help matters much, and as she still had to resort to opiates for the pain, I felt that something more radical had to be done. I asked Dr. J. S. Horsley to see this case,

and after going over it carefully he decided that her best chance of recovery lay along the lines of radical surgery. The report of his operation follows: After a multiple ligation of the left carotid and the removal of several lymph-nodes for examination, an incision was made over the left superior maxilla, beginning on the left side of the nose and following the nose around to the mid-

Fig. 568.—*x*-Ray of carcinoma of left antrum of Highmore. Lateral view.

line of the upper lip. The lip was cut through and the flap was dissected back. The bony wall of the superior maxilla appeared normal. It was thought best to explore the antrum, so it was opened with a chisel and the opening was enlarged. The bone at this point, which was the anterior wall of the antrum, seemed normal. On enlarging the opening a mass of tumor tissue was

exposed in the back part of the antrum. The wound was then thoroughly cauterized, and an incision was made below the lower left eyelid from the upper end of the incision along the border of the nose outward for a distance of about 1½ inches. An incision was made with a knife in the mucoperiosteal covering of the hard palate a little to the left of the midline. The bone of the alveolar process and the bone of the hard palate were cut through with bone forceps, and the attachment of the lower part of the superior maxilla to the upper portion beneath the orbit was severed with bone forceps. The lower portion of the superior maxilla was then removed, leaving the orbital plate intact. The tumor occupied the upper and posterior part of the antrum, and seemed to have gone through the bone at one point posteriorly and to the outer side. This, however, was not extensive. The palate bone posteriorly and all of the soft structures of the palate were left intact. The tumor was removed with the periosteal elevator, and the bone and soft tissues posteriorly were thoroughly cauterized with the Percy cautery. The whole raw surface of the wound was then gone over thoroughly with a sharp electric cautery, and every raw surface was well cauterized. This was done to prevent implantation. The septum between the antrum of Highmore and the nasal cavity was completely removed. The cavity was packed with iodoform gauze, and the wound was closed with interrupted sutures of fine silkworm-gut. The packing was brought out through the mouth.

The tumor is chiefly in two portions; these are oblong, and one is about 2 inches and the other 1½ inches in their longest diameters. On section the growth is firm and is not encapsulated. It is a grayish yellow, and resembles very much in color degenerated muscle. When the tissue is squeezed, small worm-like masses of degenerated tissue, resembling comedones, are squeezed out in different areas. The section is somewhat granular, and resembles closely in structure the section of a cut turnip. Microscopic section shows atypical epithelial cells with considerable connective-tissue stroma. In areas there are small cavities which are probably due to degeneration, and doubtless from

such regions the comedone-like bodies appear when the tissue is squeezed. The cells are epithelial and resemble, as a rule, the cells that spring from the deeper layers of the skin and the mucous membrane. Some of the cells are very large and irregular. There are a few mitotic figures and apparent attempts at cornification. The stroma is well organized, and the area

Fig. 569.—Photomicrograph of tumor from superior maxilla, a squamous-celled cancer. The stroma and cancer-cells are about equal in quantity. There are apparent attempts at cornification. Leukocytic infiltration is marked in some areas. (× 85.)

of cancer-cells is about equal to the area of stroma. In some areas leukocytic infiltration is marked. The growth is a carcinoma of the mucosa (Figs. 569, 570). The lymph-nodes did not show metastases.

"The patient made a satisfactory recovery from the operation, and was discharged on November 19, 1921. A good deal

of slough from the burned area separated during the first ten days in the hospital.

"On March 9, 1922 the patient returned for inspection. At the roof of the wound, which corresponds to the back part of the bony portion of the orbit and the tissue immediately beneath it, there was an area about ¾ inch in diameter which presented a granular appearance. The rest of the wound was smooth and

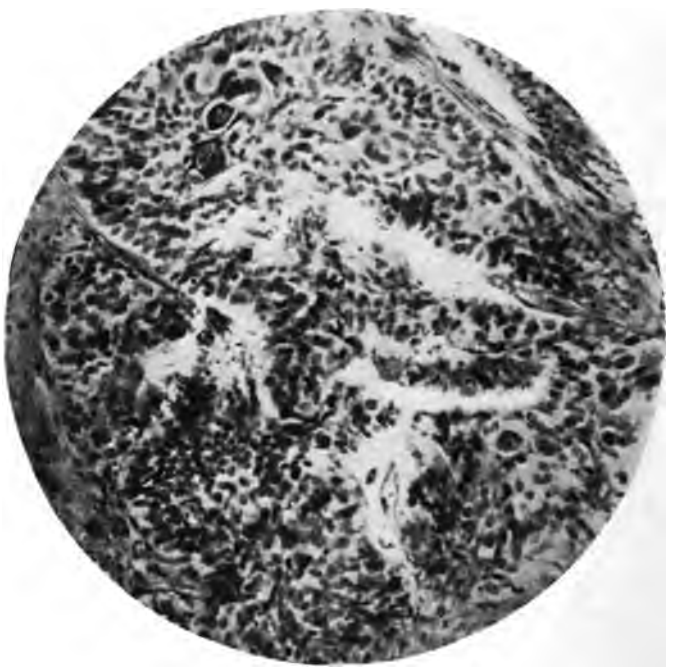

Fig. 570.—A higher power view of tissue shown in Fig. 569. Note the tumor giant-cells. (× 175.)

firmly healed, and showed no suspicion of malignancy. A piece of tissue was taken from this region with a curet, and a frozen section was made. The wound was immediately disinfected with pure carbolic acid. The section showed cancer of the squamous-cell type. Three needles of radium, each containing 12 milligrams, were inserted into this portion, and were left in for twelve hours. The patient returned at intervals, and the area of cancer seemed much smaller.

"On June 10, 1922 there was still a small place in this region which presented somewhat the appearance of cancer, and tissue was taken and a frozen section made. Cancer of the same general type as found at the operation was demonstrated; 60 milligrams of radium, screened in a copper tube, were fastened in this place by a linen suture, and gauze was packed so as to hold it in position. The radium was removed after twenty-four hours. A week later there was considerable reaction not only in the cancerous area, but in the healthy tissues around it. This gradually disappeared, leaving a small surface of necrotic tissue corresponding to the area of the cancerous growth, and extending a small distance around it.

"When last seen, on August 5, 1922, there was no evidence of recurrence."

The most important step in the cancer problem of today is an early diagnosis, and in this type of cases this is the only thing which holds out any hope for the patient's recovery. This is especially difficult where the antrum is the seat of the trouble, as cancer in itself produces no specific clinical signs or symptoms. Few cases have any distinctive nasal symptoms, nor are there any precancerous stages. Should any mechanical symptoms arise from the tumor formation they are usually very slow and insidious.

Pain is generally one of the first and most prominent symptoms. It is intense and lancinating in character, starting in the cheek and radiating, as a rule, to the frontal and temporal regions.

The presence of blood-stained mucus in the nose of an elderly person or severe epistaxis without the presence of high blood-pressure or some other definite cause is very suggestive. If upon inspection we find a polypoid-looking growth in the nose of an elderly person, which bleeds freely when probed, we should always think of cancer. As the nasal side of the antrum is the thinnest, the growth generally makes its appearance here first. As soon as it grows very large or if it starts from this portion of the antrum it soon projects out into the nasal cavity and produces a nasal stenosis. As the growth ulcerates a very charac-

teristic cancer odor becomes apparent. Should the growth proceed toward the orbit or the ethmoidal cells, impairment of vision often occurs.

Transillumination is of some value as a diagnostic aid, but is often very unreliable, because the shadow shown might be due to pus in the antrum or to a diseased and thickened mucosa.

Probably our most valuable aid in diagnosis is the *x*-ray. Whenever there is suspicion of malignancy this should be used, always bearing in mind the anomalies of the antrum, such as an excessive enlargement from expansion of its anterior and lateral walls.

The enlargement of the cervical glands is generally a rather early symptom. Loss of weight and cachexia are later symptoms.

If possible, when in doubt as to your diagnosis, a piece of excised tissue will tell you what you are dealing with, and from the type of cancer we can often learn a great deal about the virulence of the growth. Precautions should always be taken in cutting into a cancer, as by so doing you might easily stimulate the growth to greater activity.

The complex embryologic origin of this region of the antrum gives an abundant opportunity for tumors, such as carcinomata, which are, as we know, embryonic in type, and which must develop from an epithelial cell which has become abnormal in both form and growth. The antrum is more frequently the seat of malignant disease than all the other sinuses combined, probably on account of its peculiar anatomy and its relation to the teeth. These tumors may arise either from the mucosa of the antrum or from some epithelial dental structure, in which case the tumor may first appear in the natral cavity.

The more closely the cause of cancer is studied, the more intimately it is found to be involved in the process of life itself. It is merely a part of the general biologic processes involved in the growth of the body. Though the exact cause we do not know, still we have learned some things about cancer which are obliged to help us in conquering this greatest of enemies to the middle life and beyond.

There is probably some form of chronic stimulative irritation

which acts as the local exciting cause, and this exciting cause is generally aided by certain constitutional predisposing conditions. Cancer is at first always local, and hence the importance of an early diagnosis so that we can catch it while it is yet local.

Radium and *x*-ray have probably a selectively destructive action upon the cancer-cell, and for this reason have been of great aid in the cure of cancer.

In the treatment of cancer of the antrum, as in all other malignant growths, the probability of success is greatly increased by an early diagnosis and immediate action, while the growth is still local and with probably very little glandular involvement. Shall we apply radium or *x*-ray first and then surgery, or shall we first operate, removing all of the cancerous tissue possible, and then use the cautery, *x*-ray, or radium? We know that many cancers are destroyed by the defensive processes of the body and that the production of fibrous connective tissue is very important by cutting off nourishment from the cancer-cells, thus acting as a barrier to the extension of the malignant growth. Both *x*-ray and radium are said to have this power.

Radium and *x*-ray are said to suppress the normal function of the cancer-cell by their action upon the nucleus, and indirectly by producing an antibody which seems to stimulate growth against the irritating presence of the radiation. Radium acts on active growing cells more readily than mature cells, hence it may act on cancer-cells when early in their cancer cycle.

x-Ray increases the number of lymphocytes, and lymphocytes seem to destroy cancer-cells, as they seem to be susceptible to the action of toxins liberated by the destruction of these lymphocytes.

THE TONSILS AS A FOCUS OF SYSTEMIC INFECTION

THE next case which I wish to present is that of a man about forty-five years old who, up to about a year ago, had hardly known what a sick day was. He had lived an outdoor life and had always taken care of himself physically. About one year ago he went to his family physician for relief from a very severe headache which had suddenly struck him, and upon which none of the ordinary remedies seemed to have any effect.

The next day, while some examinations were being made, he suddenly had a convulsion, and shortly after that he went into a state of coma, in which he remained for several days.

His blood-pressure went up to 240 systolic and 140 diastolic, and for several weeks remained very high in spite of all treatment. The temperature, as a rule, was normal, but went up as high as 101° F. several times. His respirations, which varied from 80 to 140, were at times very labored and shallow. The examination of his urine showed it to be filled with albumin and casts, and the quantity at times alarmingly reduced. His kidney function output for the first hour was 100 c.c.; for third, 200 c.c.

Blood Wassermann negative. His blood chemistry remained fairly satisfactory considering some of his other symptoms. The blood showed the following:

Non-protein nitrogen	40 mg. per 100 c.c.
Creatinin	2 mg. per 100 c.c.
Sugar	150 mg. per 100 c.c.
C. O.	66 c.c. per 100 c.c. plasma

The examination of his eye-grounds showed a definite picture of an albuminuric neuroretinitis. The edema of the retina was very severe, the disk margin very much blurred, and numerous whitish foci were distributed all over the retina, but especially around the macular region. On account of these changes in his retina he was practically blind for a period of about two weeks. His headaches remained almost unbearable for about four weeks.

Though we felt that his kidneys were the immediate cause of his trouble, still from his symptoms we concluded that there must be somewhere a focus from which the poisons were being poured into his system, especially since he had had during the month several attacks of such a severe toxic outpouring as to make us feel that he could not possibly stand them.

His teeth were first carefully examined, and as a result several were indicted and removed. His sinuses were examined and found negative, and his tonsils were found only slightly suspicious, with a past history of never having had any trouble with his throat except possibly when he was a child.

Finally, after one of these severe attacks, it was decided to remove his tonsils, as practically all other foci had been eliminated by a good internist and his tonsils still remained slightly suspicious.

He stood the operation splendidly, which I performed under local anesthesia, and but for a severe hemorrhage, which occurred without any attributable cause on the eighth day, his recovery was as good as could be expected. I found deep down in the left tonsil a large amount of pus which I believe was the important factor in causing his trouble.

Since then he has had no more attacks, his blood-pressure is about normal, and his kidneys are now doing nicely. His vision, which for so many weeks had been reduced to seeing only large objects, has now improved so that he can read, drive his automobile, and play golf, though he tells me that his accuracy in his game is not all that might be desired.

The question of tonsils as foci for systemic infection is not a new one, as in 1789 Eyerlen, of Christiana, considered the relation of tonsillitis and rheumatism as clinically evident. In the past few years this subject has become such an important clinical problem that I feel no excuse is necessary for bringing up this type of case.

Much has been learned in the past few years in regard to the tonsils and their behavior, but, unfortunately, much of this information has not as yet become a definite part of the diagnostic armamentarium of the average doctor. This subject is not the

simple question that some would have us think it is. The more it is studied, the more systemic diseases are found referable to diseased tonsils, and, in fact, it would be hard to give a complete list of the diseases which owe their origin to infection in the tonsils. Since so many doctors feel that it is an easy matter to tell when a tonsil is diseased, and, furthermore, since a large majority of them feel that they are able to remove them satisfactorily, the seat of the average tonsil in its bed is a very precarious one. To add to this is the fact that the public have learned of the dangers resulting from diseased tonsils which have remained too long, and are coming to us with their self-made diagnoses and almost demanding that their tonsils be removed, for symptoms even as trivial as "that tired feeling." With these factors at work it is no wonder many tonsils are left in that should be removed, and many are slaughtered that could be spared.

Let us consider for a few minutes the location and structure of the tonsil so that we can better understand how this organ, which has been supposed by many to act as a protective barrier against bacterial invasion, especially in early life, should now be considered a perfect cesspool for germs which seemingly, at times, can pass through it without any trouble, and thus gain entrance into the blood- or lymph-streams which carry the infections to the various parts of the body.

The tonsil, situated as it is between the pillars of the fauces, is kept bathed by the secretions from the mouth and the drainage from the posterior sinuses through the postnasal space. The lymphoid tissue of the tonsil surrounds about fifteen to twenty deep and often tortuous depressions or crypts. These crypts are the source of our tonsillar trouble, and the question seems to be one of drainage more than anything else. The crypts are often very tortuous or have pockets in them, or have their mouths entirely closed up by the folds which surround the tonsils. In this way they retain and keep active the various germs which may have gotten in with the food and tissue débris which often fill these crypts. The thin epithelial lining of the crypt offers a very slight mechanical barrier to the entrance of the germs into

the tonsil proper, especially when the crypt is mechanically closed or its drainage interfered with by anything which may stop up its mouth.

It is a very general opinion that a laryngologist should always be able to tell when a tonsil is sufficiently diseased to require its removal, but this is at times practically impossible. There are certain symptoms, however, which if taken in connection with the past history will generally help us greatly in deciding this point.

One of the things which should by this time have become the common property of us all is that the size of the tonsil has nothing to do with its pathology. In fact, the tonsil which gives us the most trouble is the small or buried tonsil with its crypts possibly closed or covered by the pillars which surround it. How often do we find a small piece of tonsillar tissue about the size of a pea, with only one crypt in it, giving just as much trouble as the whole diseased tonsil gave when we started to remove it?

In the examination of a tonsil the first thing to find out as best you can is what has been the behavior of the tonsil in the past, as upon this information much of the indictment should depend.

If the acutely infected tonsil comes under our observation during the attack, there is not much trouble in deciding about it, but we find so often in getting a history that it is very hard for the patient to be able to differentiate between a true tonsillar infection and an acute sore throat or pharyngitis which he says has been troubling him in the past.

When we come to the chronically diseased tonsil our diagnosis is often much more difficult, especially when there is little local evidence of any trouble. Little information can be obtained from merely inspecting the tonsils unless they be thoroughly diseased, as practically all of the trouble comes from the crypts. To examine these either suction or pressure must be exerted to demonstrate the nature of their contents. I prefer Hurd's suction apparatus (Fig. 571) which on account of its simplicity can be used easily on even the most nervous patients. By putting the large end of the glass tube over the tonsil and exerting

pressure by means of the very hard rubber ball the contents of the crypts can be easily drawn out and examined. I also find an ordinary postnasal applicator with cotton on the end very helpful in exerting pressure on the tonsil, and thereby gaining much valuable information as to the size of the tonsil and the amount of retained secretion present.

Fig. 571.—Illustrations of instruments used in drawing out the contents of the tonsillar crypts. Hurd's suction tube.

If by expression pus is seen to come from the crypts, we are certain we have a diseased tonsil to deal with, but should there be only a moderate amount of cheesy secretion in the pockets without any other evidence of infection, we do not feel that we can condemn the tonsil until we have observed it further. A great many people complain of these cheesy masses from the odor they produce, and in some cases this alone is a sufficient cause for the removal of the tonsils.

One of the most valuable symptoms of a chronic infection of the tonsil is a peculiar circumscribed area of redness on the anterior pillar just in front of the tonsil. This symptom is most often seen in the small tonsil which is buried down between the pillars. Often when we apply pressure to a tonsil there appears a whitened area which if touched with a knife is found to contain pus. This type of

abscess may be found in any part of the tonsil, and if it is well walled off may not give rise to much systemic trouble.

The enlargement of the anterior cervical glands which is so commonly seen in the case of children with diseased tonsils is a very important symptom. The question of cervical adenitis is one which requires a great deal of study, and after we have gotten rid of all dental and tonsillar infection we still often find very little change in the glands. We also often find some cases which are without any glandular trouble at the time of the operation, but which later on have some trouble to appear.

The tonsil whose infection is most difficult to detect is the one which superficially shows no signs of chronic inflammation, and about which we can get no history of its ever having been acutely inflamed, and still we feel from the history of the case, after all other foci of infections have been excluded, that the tonsils cannot be given a clean bill of health. It is often very hard to get the patient to see our point of view in this type of case unless he is suffering, and still how often in operating on these dormant tonsils do we find deep down in the tonsillar tissue a collection of pus which has entirely evaded our present methods of diagnosis. It is in this type of case that we so often get results which well repay us for the time spent in working upon them.

When we come to the question of the operation there are certain facts which should be emphasized. How we can best completely remove the tonsil in its capsule with the least amount of trauma to the surrounding tisues is the goal we should all strive to reach. Unfortunately, no operator is going to remove all of the tonsil all of the time in spite of the claims that are often made to the contrary. One of the most serious problems in tonsillar work today is how can we get our patients who have had a small piece of tonsillar tissue left in the fossa to come back to us for its removal, rather than go to someone else for the work? How easy it is to remove that little nodule of tonsillar tissue which probably is only the size of a grain of wheat if the patient will only come back to us, but what a mountain that mole hill is made if some unfriendly confrère picks it up!

A case I have just seen illustrates this point well. A woman

of about forty-five was sent to me about a year ago from a neighboring village to see if I could find out what was poisoning her. She had become extremely nervous, had no energy, and was getting into a terribly run-down condition.

After going over her thoroughly I finally decided that the possible focus was in her tonsils, and therefore advised an operation. This she consented to, and upon the removal of the tonsils

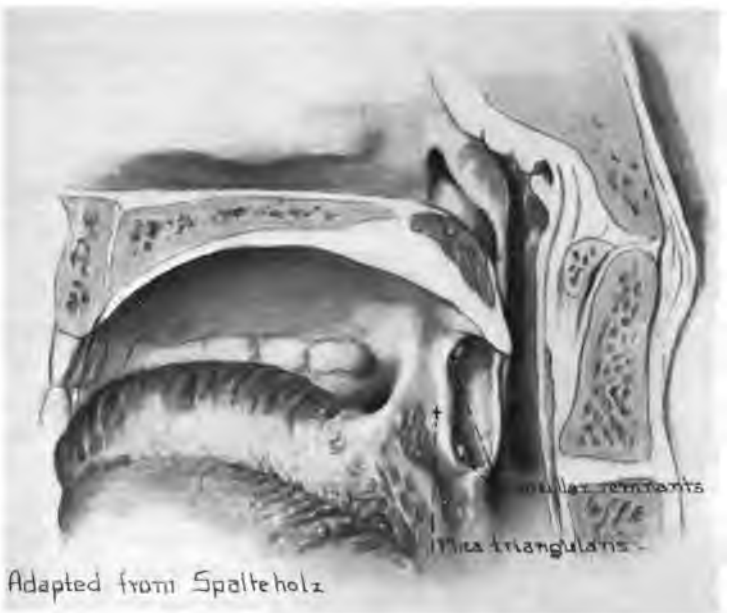

Fig. 572.—Diagram of the tonsillar fossa showing the presence of two small pieces of tonsillar tissue, which so often give trouble when overlooked.

I found a focus of pus in the right side. Her improvement was very rapid and within a few weeks she was practically as well as usual. About four weeks ago she began to have some of the same symptoms which she had previously had from her tonsillar infection, but, feeling certain that her tonsils could not be giving any trouble, she went to her dentist to see if one of her teeth might not be the cause. Fortunately for all parties concerned, the dentist was a scientific man and looked further than the

teeth and noted a little red spot at the upper pole of the tonsil (Fig. 572), which he thought looked suspicious. When I saw it there seemed to be such a very slight redness about the small scar at the upper pole that I hardly felt that it could be giving any trouble, but after exerting right much pressure around it I finally located a small fistulous tract from which I was able to press a drop of pus. Her symptoms immediately disappeared, so I am certain this was the cause. It is often a very easy matter to overlook a very small piece of lymphatic tissue at the upper pole back behind the anterior pillar, or down at the lower pole at the plica tonsillaris, and when these hypertrophy they can easily give rise to systemic symptoms (Fig. 572).

How can we operate so that we will least often leave any portion of tonsillar tissue? It does not make much difference what method or instrument is employed, just so you perfect your technic so that you can remove all types of tonsils in their entirety. Some of the factors which will help in accomplishing this are a good anesthetist, a good light, an ether suction apparatus, and an assistant who is really able to assist. The two methods which I consider the best and which I think every operator should master are the dissection and snare method, and the Sluder method or some of its modifications, for with these two we should be able to remove all tonsils.

For children I prefer the Beck-Müller instrument, which is used by forcing the tonsil through the fenestra of the instrument and crushing it out by means of a very heavy wire. I find an ether suction apparatus and a good mouth-gag with a light attached very essential for keeping the mouth free from blood, and at the same time the field is flooded with light both for myself and assistant.

In the case of adults I prefer the dissection and snare method, and whenever practicable I use a local anesthetic. The success of a local anesthetic depends more upon the deadening of the pain than anything else, for without a complete anesthesia there is going to be difficulty in removing the tonsils properly. I always take the coagulation time of these cases, as any one will who has once had an experience with a hemophiliac.

CLINIC OF DR. E. DENEGRE MARTIN

CHARITY HOSPITAL, NEW ORLEANS, LA.

MASTITIS PUERPERALIS

History of Case.—Colored woman, thirty-two years of age. Multipara. Infant two months old. About one month ago left nipple became sore, then breast began to swell and pained, followed by chill and fever. Abscess formed and was lanced, but gave only temporary relief. Soon after right breast began to swell at base, but gave little pain.

You have heard the history of this patient. It is about the same in 90 per cent. of all such cases. This is the third abscess of the breast brought before you this session for which we have no apology to offer. In these busy days when surgeons are delving into the mysteries of the unknown for something new and startling, it is well, occasionally, to stop for a few moments and look back, lest we forget some of the old-fashioned every-day conditions which, like this one, are always with us and which need just as much attention as high blood-pressure, stomach lavage, and metabolism.

Let us now examine the left breast. We have a well-defined tumor occupying the lower and outer quadrant of the gland. This portion is hard as compared to the rest of the breast, yet we can detect some soft spots on the surface, indicating deep suppuration. The diagnosis is not difficult; the trouble began soon after the birth of her infant. The nipples were sore and at times very painful, the skin tense, shiny, and painful to the touch, and the onset was ushered in with a chill and fever, giving evidence of intraglandular infection. There are few phlegmons more painful than an infected mammary gland, and if not properly treated it may cause great distress and suffering, and even result in the complete destruction of the gland; and not infrequently the scar tissue becomes a source of irritation, a possible cause for the later development of malignancy.

To better understand the condition confronting us here let us study the structure of the gland. It lies just beneath the superficial fascia and rests on the fascia of the great pectoral muscle, to which it is loosely attached by processes of connective tissue. It is made up of from fifteen to twenty lactiform ducts, one for each lobe, and pyramidal in shape, the ducts converging toward the nipple and emptying into it through very fine openings. The whole is embedded in a stroma of fat and connective tissue.

We may have mastitis at any age and from many causes, but this form, "mastitis puerperalis," is the most frequent, beginning a few weeks after confinement. This, however, must not be confounded with the mastitis of the puerperal state due to the sudden onrush of milk, beginning usually within a few days of delivery. Here, too, we may have many of the phenomena of infection, but these subside rapidly after massage and the free use of the breast-pump. If persistent, I have found that a mixture containing 1 part of strong ammonia, 2 parts of laudanum, and 3 parts of camphorated oil, mixed and applied over the inflamed area, will invariably give relief. Mastitis from infection is a more serious condition. In the puerperal state, especially in primipara, the nipple if not properly treated is subject to fissures and excoriations, and through these infection is apt to spread. A slight abrasion about the nipple is often the cause of superficial abscesses forming about the areola, and sometimes deeper, they are caused by invasion of the cellular tissue through these fissures in the nipple. These are easily aborted by opening and thorough cleansing. When, however, micro-organisms find their way into the ducts, the condition is one requiring more radical treatment. Intramammary abscesses are often attended by severe local and constitutional manifestations. One or more of the ducts may become involved, the infection may extend from the duct to the connective tissue. The density of the gland causes pressure on the inflamed area, resulting in all the phenomena usual in these cases, and subsiding only when the abscess has found its way to the surface and ruptured. The invasion may be so extensive that

unless checked the entire gland will be destroyed, as was the result in a case brought before you a short time ago. In the case before us, though half of the breast is involved, the process does not seem to have been very active. That portion of the gland involved is evidently studded with small abscesses, and is much like a sponge soaked in pus, the connective tissue is breaking down, and the ultimate result would be a large abscess. Drainage is our only hope, nor should we wait until the mass has broken down and fluctuation is present. Just so soon as the inflammation has gone beyond the control of ordinary measures, drainage should be instituted. The infected area should be drained by the technic to be suggested. By acting promptly a long convalescence will be avoided and much of the gland saved from destruction. Your text-books will tell you to drain these abscesses through long radial incisions to avoid destroying the ducts. These incisions are most disfiguring, and several must be made to accomplish the purpose. It frequently means, too, that the patient must be subjected to several operations. Some years ago I was impressed by a suggestion of J. Collins Warren for the removal of breast tumors. This he did by making an incision in the fold of the skin at the base of the gland, lifting it from its bed, and removing the tumors. It occurred to me that this was a rational operation not only for the removal of tumors, but for draining the gland, as it resulted in the least deformity and far less scar tissue which is at times a menace. For years I have adopted this procedure for draining all intramammary abscesses. I will now make an incision about one-third the circumference of the gland along the fold of skin, the gland is now freed at its base, and with my fingers I am breaking up all the connective tissue between the abscess cavities. You see the pus flowing from the wound. The pockets are all opened into one large cavity. When the tissues are too tough to break through with the fingers, a pair of Mayo scissors may be used. I will now pack the cavity loosely with sterile gauze; this will not only drain the parts but also prevent hemorrhage. Where there is no hemorrhage I use a piece of rubber tissue. This can be left in for several days, depending entirely upon

the indications. Relief will be almost immediate. The pulse-rate will drop, the temperature will be lowered, and, what is more important, the patient's appetite will return and convalescence will be hastened; and, most important of all, the operation has been thorough and there will be no further indication for surgical interference. These operations should always be done under a general anesthetic. As it requires but a few moments to accomplish the feat, I have frequently done it with ethyl chlorid as the general anesthetic.

Now that we have disposed of this case, let us see if we could not have prevented this abscess and saved the poor woman much suffering besides the trouble and inconvenience she has undergone.

These cases are the result of ignorance or neglect. The preventive treatment, which must be the aim of every conscientious practitioner, should begin, especially in the primapara, from six weeks to two months prior to the birth of the child. As the nipple is protected against exposure, it is, like other parts of the body, covered with clothing, easily bruised, and should be prepared to meet the test soon to be put upon it. I want to condemn the practice of making applications of such drugs as will harden the nipples. It is not hardening, but toughening, that we want. A hard nipple will crack easily, resulting in fissures and excoriations. Have you ever noticed that surgeons or other people who scrub their hands frequently with a nail-brush never have corns or blisters upon them, even though they do manual labor at odd times. My attention was called to this fact many years ago. Let us then apply this principle to the nipple; we can also help in giving shape to retracted nipples. Beginning six weeks before confinement let the patient each night before retiring apply lanolin to the nipple, rubbing it in well by catching the nipple between the thumb and fingers. This macerates the skin and loosens the epidermis scales about the nipples and areola. The next morning the lanolin is to be removed by scrubbing the nipple with a soft tooth-brush dipped in warm soapy water. Perhaps for two weeks this will be found a little painful and disagreeable, but before the lapse of a month a tough rubber-like nipple will be developed, capable of with-

standing all the trauma applied by the gums of a nursing infant. My assistants and I have prepared several hundred cases in this manner, and have yet, so far as I know, to encounter the first case of fissured nipples. And this is not all, it does away with the after-care of the nipples, often tedious, especially if tender and sore.

Now let us for a moment look at the right breast. You will notice that there is quite a large fluctuating tumor at the base on the axillary line, the base is raised. The patient has suffered little inconvenience from this. The mammary gland is apparently free from infection, the nipple is normal, and the entire breast soft. There is a submammary abscess due to a suppurating gland. I have opened it; note the difference in the character of the pus. It is thick and tenacious, probably tubercular. It is unusual to see both breasts involved at once, and each from a different cause. We will swab this cavity out with iodin and pack it with iodoform gauze. Whether this is more effective than the sterile gauze I doubt, but we do it as a routine. However, if we had no iodoform gauze I would not feel that my patient would be any the worse off. I have not gone thoroughly into this subject, as time will not permit, but I want to impress upon you the importance of free drainage which is best accomplished by the technic I have suggested, and which we know, from a long and varied experience in this service, is all that we claim for it.

There is another condition of the breast which belongs to the puerperal state, though it may develop at other times. I refer to the cystic enlargement of one or several of the milk ducts, known as galactocele. It is quite rare. I have seen but 2 cases in a rather extensive experience. It develops with lactation and is due to obstruction of the duct. In the beginning the contents of the cyst are pure milk; later, owing to clinical changes, such as the absorption of the fluid contents, it may become thick and creamy. The consistency of the tumor depends, of course, upon the contents—if examined early, it is fluctuating; later, it may become semisolid. As a rule these collections are found beneath the areaola and are small, occasionally a large

galactocele is encountered. They are never attended by any constitutional disturbance, and seldom give trouble and inconvenience unless large enough to cause pressure. They are, as a rule, easy to differentiate from other tumors of the breast; they come on rather suddenly, are smooth to the touch, not adherent to the skin, and not attached to the base; some have been known to persist for years. And yet these innocent tumors require attention, as in extreme cases they have been known to rupture, giving rise to inflammation or ulceration, at times creating fistulæ which persist. To merely aspirate these cysts is not sufficient, nor will the injection of iodin suffice. It is far better to open them freely and pack. They may also be dissected out and the wound closed primarily.

I have brought before you a number of cases of cancer. You have no doubt been impressed with the prevalence of this disease in the colored female. You must have observed the utterly hopeless condition in which many come to us without the vestige of a chance of a cure, in many cases not even prolongation of life. Let me again make a plea for the poor unfortunates. They are not to blame. What do they know of cancer? Nothing. When they come to us the layman can make the diagnosis. The blame in the entire matter rests with *you*. The practitioner is, as a rule, too self-satisfied, too content to look only upon the condition to which his attention is called by the patient, often the result rather than the cause. No matter what woman comes into your office, make an examination of the breasts. It is not necessary to expose them; merely loosen the clothing, a simple matter in this day and manner of dressing, slip your whole hand, not your finger, over the breast, and by gently passing it over the entire breast you can detect a small tumor or deformity; except, of course, in very fat subjects. I have known women to be operated on for pelvic conditions which were found to be secondary to a cancer of the breast which had been overlooked. There is no excuse for such an oversight. Introduce some business methods into your practice and take an inventory of your goods; if you don't, you will soon find some doctor doing it for you.

FRACTURED PATELLA

THROUGH the courtesy of Dr. Landry I wish to present to you this patient.

While at work on a scaffold, 5 feet high, he fell, striking his knee against the floor. He felt something give way, and on attempting to rise realized that he had injured his knee. He

Fig. 573.—*a*, Upper fragment widely separated from lower. *b*, Lower fragment tilted upward. Radiograph taken immediately after accident.

was conveyed to the Touro Infirmary, where this radiograph was taken, revealing a fracture of the patella. Here you see a marked separation of the fragments (Fig. 573), with the lower fragment tilted upward. As the knee was greatly swollen at the time an ice-bag was applied and the patient kept at rest for two weeks.

On May 11, 1921 he was prepared for operation under a general anesthetic, and at my suggestion Dr. Lucien Landry wired his patella in the manner in which I shall later describe. The wound was dressed, a posterior gutter splint applied, and the patient kept in bed for two weeks. He was then allowed to get about on crutches with free use of the leg to the point

Fig. 574.—Radiograph of Dr. Landry's case taken nine months after operation. Shows position of wire and close approximation of fragments.

of pain. This soon subsided, and in two months he returned to work.

This is practically the history of 6 of my own cases treated in like manner; 2 of the radiographs I have here (Figs. 575, 576). This radiograph (Fig. 574) shows the result in this case. It was taken on March 10, 1922, approximately nine months after operation.

I cannot agree with some authorities that the patella is a mere sesamoid bone and plays but a minor part. This error

no doubt arises from the fact that the legs are used most when erect, and in this position are more easily flexed and extended, but only by the preservation of the patella in its entirety can 100 per cent. efficiency be maintained. This is recognized by Albee, Bricknell, Groves, and many others as shown by their elaborate technic, all of which is unnecessary and merely adds to the danger of an infected and stiff joint as the result of a tedious operation and added trauma to the already existing injury.

Fig. 575.—Recent skiagraph of patella fractured eighteen years ago. Wire can be seen in position, union perfect.

The knee, though a hinge or ginglymoid joint, has a peculiar sliding motion which is so controlled by the crucial and lateral ligaments that some portion of the surface of the condyle is at all times in contact with the head of the tibia, resting in the sulci formed by the semilunar cartilages. Extension is provided by contraction of the quadriceps extensor, which forms the long arm of a lever of the first degree, the patella, the fulcrum, the patella ligament, the short arm. You will note from this skiagraph (Fig. 574) that the tendon and ligament do not come in contact with the bony surfaces, but are held apart

from the condyles and head of the tibia by the patella, and that no matter at what angle the leg is flexed the patella rests upon the condyles in such a way as to allow the greatest force to be exerted through it as a fulcrum, that is, it is raised at the highest point above the surface and, of course, the higher the fulcrum within certain limits, the greater the force which can be applied.

If, therefore, the patella was removed and the tendon was continuous from the quadriceps to the tibial tubercle, no force possible by muscle contraction would be great enough to extend the leg if flexed on the thigh, when resistance was met, as, for

Fig. 576.—Skiagraph taken seventeen years after fracture. Result perfect.

instance, in the "squatting position." If, therefore, the patella is not restored to its normal contour after fracture, the efficiency of the limb is impaired just in proportion to the lowering or separation of the ends, which means lowering the fulcrum. What, therefore, does the preservation of bony union of the patella mean? Just 100 per cent. efficiency

Now, to correct this, the joint must be opened, the edges of the torn capsule trimmed off, and the fragments brought into contact and held in apposition not only until the capsule unites, but until bony union is firm, a matter of six months

or more, for, remember, we are dealing with a porous bone. The mere suturing of the capsule with catgut or tendon is not sufficient, as shown by statistics. From those I can recall, about 81 per cent. showed bony union, 18 per cent. by bridge of bone, and, of course, a lowering of the fulcrum, and 18 per cent. no bony union. Corner's statistics show another interesting fact, and that is that refracture occurs in from 69 to 89 per cent. in all cases within one year. I have myself seen 3 cases give way after suture within three months of operation.

Fig. 577.—*A*, Wire run through tendon. Dotted lines over patella show position of wire when tightened and fastened.

The knee having been prepared by the usual method, make a transverse incision across the patella, and in this case almost between the fragments. The joint is now opened. Remove any clots, freshen the edges of the capsule, and hold the fragment in position with a double end vulsella; one side is fastened into the tendon above and the other into the patella ligament below. The capsule is sutured in several places to prevent the fragments from slipping. Now take a heavy cervix needle threaded with a piece of No. 19 annealed iron wire, such as is used for securing stovepipe. The needle is passed deep down into the tendon and as near the patella as possible (Fig. 577). The wire is pulled through and passed in the same manner through the

ligament below; the ends are brought together and tightly twisted over the top of the patella, leaving the wires about ½ to ¾ inch apart, over the top of the patella, and with the twisted ends buried in the soft tissue. The vulsella is now removed and the fragments are held in perfect apposition to each other; flexion of the leg, of course, only throws more strain on the wire and forces the fragments tighter together—not for a week or a month, but as long as the patient lives. I am ready to back up this assertion at any time. I have 7 cases treated in this way, ranging from one to eighteen years.

Here you have an internal splint taking the place of the cumbersome external apparatus that you must use if you perform any other operations that I know of. Close the wound without a drain, using silkworm sutures about ½ inch apart and at least ½ inch from the edge; the further you place your stitches from the edge of the wound, the fewer you need insert; this, too, has the advantage of letting any serum escape. Apply an ordinary bandage and put on a posterior splint or, what I prefer, suspend the leg in a Hodgens splint with flexion at 165 degrees for a week or ten days, until the wound is healed. The patient is then allowed to leave the bed and to get about on crutches just as soon as he can safely manage them; no splint of any kind is applied.

There is a great advantage in flexing the leg after operations of this kind, and especially is this true if suture of the capsule alone has been the operation of choice, for passive motion is then begun by extending rather than flexing, and adhesions are broken without bringing any strain on the line of suture about the patella.

Now, let us see what advantage this man has gained from the operation: (1) It allowed him to get back to work in just half the time he could have returned if any other operation had been performed.

(2) He did not suffer from a stiff joint and required no massage, as he had the free use of his leg almost from the beginning.

(3) He had 95 degrees flexion in three to four months. This, of course, depends upon the patient to a large extent.

(4) He has a guarantee against refracture. Just think what that means!

Before finishing let me say first a word regarding the use of wire. When any foreign body of this character gives trouble it is because it has not been properly used. If it is so fixed that it is absolutely stationary it will never give trouble. Here it becomes an integral part of the patella. It becomes buried in the capsule and moved with the patella. Do not use anything but

Fig. 578.—Skiagraph showing slight separation of fragments resulting from fall four weeks after wiring.

common annealed iron wire; it is stronger than any other and inexpensive.

Now, let me show you a skiagraph of the only case in which there is a lowering of the fulcrum (Fig. 578) by a slight separation of the fragments. This case was operated upon two years ago. He returned to his occupation as switchman three months after the operation and, so far as he knows, has a perfect limb. About four weeks after operation he slipped on his crutches and in an effort to catch himself threw his weight on his leg. At this time he felt a slight pain in the knee. It was painful for several days and slightly swollen. This skiagraph was taken and you see the

result. By the simple suture method he would have sustained a refracture.

It is true this would never have occurred so soon after any other operation, as the patient would still be in bed, but it would have occurred at any time within a year.

For the timid operator I would suggest the use of a walking caliper splint now so much used in femur fractures. This could be used during the day, or even night, especially if suturing alone has been the choice of the operator. This would allow the patient to get on his feet much sooner and enjoy the physical exercise so essential to an early convalescence.

SIMPLE METHOD OF DRAINING THE BLADDER AFTER SUPRAPUBIC PROSTATECTOMY

THIS patient is seventy-two years of age. He tells us he has always enjoyed excellent health. This statement is undoubtedly correct, as his appearance shows it. For the past eight months, however, he has had trouble passing his urine. At first he did so at frequent intervals, but lately it has not only been frequent, but it has been with great difficulty, and his bladder never seemed to be empty. Finally, two weeks ago, it suddenly stopped and his pain was such that a physician was called, and after some effort succeeded in passing a metal catheter. This gave only temporary relief, and it had to be repeated several times; each time the catheter was introduced his suffering was more intense, and he decided to come here for relief.

On admission to the hospital ten days ago we found the patient suffering acutely, although morphin had been given to relieve his pain. A mass was palpable above the pubis and tender on pressure; it proved to be a distended bladder. Rectal examination revealed a large and very tender prostate. Temperature 102° F. The bladder was easily entered with a Tieman prostatic catheter, the bladder emptied, irrigated, and the catheter left in for the night.

The patient was prepared for operation next morning. Half an hour before the time set he was given $\frac{1}{4}$ grain of morphin and $\frac{1}{150}$ grain of atropin. Under a local anesthetic ($\frac{1}{2}$ of 1 per cent. novocain) the bladder was opened just above the pubis. The prostate was larger than was apparent by rectal examination. A Pezzer catheter was inserted and the wound closed tightly around it to prevent leakage. Since that time the bladder has been irrigated daily with a 2 per cent. boric solution. All symptoms of infection have abated and he is comfortable, but he must have permanent relief, and as a prostatectomy is his only hope, we have prepared him for operation this morning. The phthalein

test was not made in this case, but it should be done as a matter of routine.

The history of this patient is that of thousands of others. He attributed his trouble to his age and felt that he had to pay the penalty. I want to throw out just one suggestion right here: this man was made to suffer unnecessarily not through the ignorance of the attending physician, for he was thoroughly competent to handle the case, but through neglect in not having a prostatic catheter. Before you return to your homes provide yourselves with a prostatic catheter—the Tieman, the Coudré, and also the flexible metal catheter; one of these will always turn the trick without injuring the prostate, resulting frequently in hemorrhage and blocking. If you find great difficulty in introducing a catheter, an exploring needle thrust into the bladder just above the pubis will give relief, and frequently the patient will void later with little difficulty, and be comfortable until he can be given the proper care. This man's physical condition is excellent, and as there is no contraindication to a general anesthetic—and there rarely is—we are giving him gas; if necessary we will give ether.

We now introduce a catheter into the bladder, through the urethra, and irrigate through the two catheters. Now remove the suprapubic catheter, which you see has done its work well; the skin is in perfect condition. We will now enlarge the wound sufficiently to introduce one or two fingers, taking care not to open the peritoneum. We can now palpate the entire prostate. With the assistant's fingers or the operator's in the rectum the gland is held firmly against the dissecting finger. Following the catheter in the urethra as a guide, the finger is forced into the prostatic urethra, rupturing the capsule, and peeling the gland up from the back, as suggested by Squier. The left lobe is now entirely free. Now, to remove the right—this is more difficult; it seems more adherent and is harder to reach. We now remove the glands from the bladder. You see their large size, which is an advantage, as the larger the gland, the more easily they seem to peel out. We now come to the final dressing of the case. One of the problems we have to meet is "hemorrhage." This we

can guard against by inserting a pack against the bleeding surface, pressing it snugly into position with the finger, and keeping up pressure for twenty-four to forty-eight hours.

Now please remember this man will not be under an anesthetic when the pack is removed, and if you can do this without causing much suffering you owe it to the patient. We take a strip of iodoform gauze, 12 to 15 inches long and about 6 inches wide, fold this on itself several times, making a strip about 1 inch wide. Thread this piece of heavy silk, 18 inches long, through the length of this gauze and tie the middle of the thread to one end of the strip. Now fasten the loose end of the thread to the catheter and pull it through the urethra; as the gauze comes in contact with the bladder wall it will pucker along the string; with my finger I press it gently into the wound. The opposite end is left in the opening above to be used when the pack is removed. To remove, pull on this end and the gauze will unfold and can easily be brought up through the suprapubic opening without much pain or discomfort. The last and most difficult problem now confronts us: it is a problem which any surgeon doing this work has had to face and many have tried to solve. How well do I remember our efforts with the Dearborn syphon. Later I devised an apparatus which you will find described in the proceedings of the Southern Surgical Association, 1900. This worked very well and was most satisfactory provided a nurse was constantly in attendance to watch it, and finally I hit upon the plan I will show you here—the simplest and most effective I have yet tried, and, better still, it is automatic if kept clean.

Here is a piece of rubber tubing $\frac{5}{8}$ inch in its inner diameter. Introduce this through the suprapubic opening until it touches the fundus of the bladder; now mark it at the level of the skin; remove the tube, make a hole in one side near the bottom so as to allow the urine to enter freely; at the point on the level with the skin make an opening just large enough to introduce a No. 10 or 12 catheter, not smaller; draw this through the hole toward the bottom of the tube as far down as the opening made below. We now insert the tube with the catheter in position into the bladder, and with a few silkworm stitches close the wound snugly around

the tube. Now fill the tube with water. You see that just as soon as the water rises above the point where the catheter is inserted it begins to flow through the catheter and syphons the bladder; this is exactly what will occur when the urine in the bladder rises above this point. Add enough tubing to carry it into a receptacle attached to the side of the bed. It is popular both with the nurse and with the patient, as it works while both sleep.

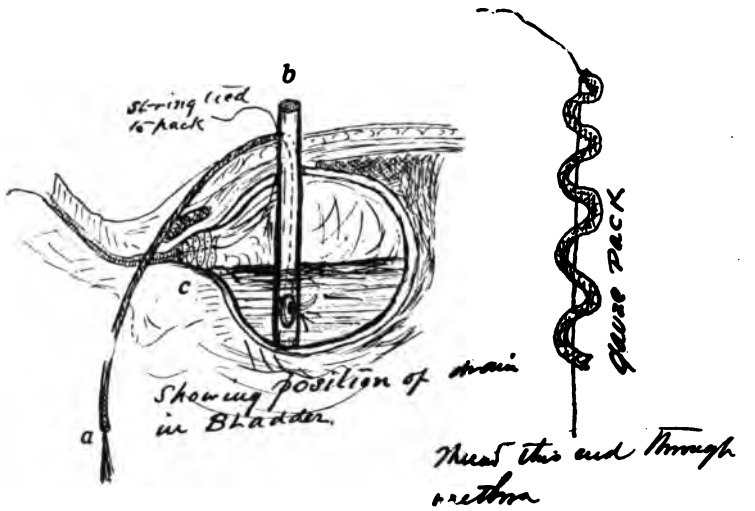

Fig. 579.—*a*, Catheter passed into drainage-tube (*b*) through small opening just above surface of skin and carried to lower end of tube, as shown by dotted lines; *c* shows pack in position.

To irrigate the bladder, run the solution through the catheter and the water will flow up through the tube. This gauze pack must be removed in forty-eight hours. Before doing this thread the end of the silk in the meatus through a catheter so as to guide the catheter into the bladder, and allow the catheter to remain, though I do not think this is necessary, for it is easy to irrigate the bladder through the urethra at all times.

Remove the drain to do this. It is easily re-inserted. If you meet with any difficulty, bevel the tube, making it pointed on one side, and it will slip in readily. I have used this simple

device for many years, and it has been more satisfactory than the most complicated apparatus. As soon as the urine clears, the drain can be removed and the wound drawn together with adhesive strips and the urine allowed to pass through the catheter in the urethra.

Note.—This man made an uneventful recovery and was kept dry and comfortable the whole time.